

DECLASSIFIED BY AF/HOH
IAW E.O. 13526
DATE: 2010/1986

APPROVED FOR
PUBLIC RELEASE

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Plans and Policies for
the Ballistic Missile
and Operational Capability
Program

by

Max Rosenberg

[REDACTED]
February 1960
USAF Historical Division Liaison Office

[REDACTED]
[REDACTED]
[REDACTED]
SHO-S-60/75

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

FOREWORD

The development, production, and operational deployment of intermediate-range and intercontinental ballistic missiles probably constitutes the most intensive, complex, and expensive military program ever undertaken in American history. Certainly, it far exceeds in scope any other program attempted during a peacetime period. The objective of the program was far more than just the attainment of operational weapon systems. The continuance of peace, an uneasy one to be sure, and the very future and well-being of the "free world" depended in large measure upon a successful and energetic prosecution of the ballistic missile program.

The United States Air Force, apprised through the media of several special studies of both the urgent requirement for rocket-propelled missiles and of recent major technological advances and possibilities, responded in 1954 with the establishment of a unique organization and management structure to carry out the important job. The structure was designed to harness the composite skills, knowledge, and facilities of the military service, the scientific world, and American industry in a major, concerted effort. No less important, the Air Force expected the new approach to compress the development-production-operation cycle by eliminating much of the inherent "red tape" so characteristic of the coordinating and decision-making processes at the various echelons of command and control.

The Secretary of Defense and the President took special measures at their levels. They established special units and instituted special procedures--all for the purpose of easing the management task. They assigned the highest priority ratings to the program and removed likely areas of administrative impediments. Finally, they kept themselves intimately informed on each step of progress during the course of the program.

This historical study covers only a unique part of the novel organization and management structure employed in the ballistic missile program. The particular topic under review concerns the formulation of policies and the preparation of plans for an initial operational capability--the scheme for obtaining and deploying production prototype ballistic missiles at the earliest practicable date as an addition to this nation's deterrent forces. At first glance, the subject appears narrow in scope. The ballistic missile program, however,

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT~~

is so broad and complex that the story of the initial operational capability is indeed a topic of wide breadth and immense significance.

Historians elsewhere in the Air Force--at the Air Force Ballistic Missile Division, the Ballistic Missile Center, the Air Force Missile Test Center, the Strategic Air Command, the Air Training Command, the 1st Missile Division, the 7th Air Division, and other organizations--are covering through the means of semiannual and case histories the "operational" role of their organizations in the establishment of an initial operational capability. Accordingly, the author of this study has restricted his work to the "plans and policies" aspect, primarily at the Washington level. He has referred to other phases of the program only to the extent deemed necessary in making the "plans and policies" story a complete one.

The author is grateful to a large number of participants in the ballistic missile program at Headquarters USAF and at the Air Force Ballistic Missile Division for their assistance and advice in the preparation of the study. He is particularly indebted to Maj. Gen. Charles M. McCorkle, Assistant Chief of Staff for Guided Missiles from late 1956; his successor in mid-1959, Brig. Gen. Robert E. Greer; Col. Leo C. Brooks, chief of the Missiles Branch, Strategic Division, Office of Deputy Chief of Staff, Operations; Lt. Col. Edwin J. Istvan of the Ballistic Division, Office of the Assistant Chief of Staff for Guided Missiles; Brig. Gen. Charles H. Terhune, vice commander of the Air Force Ballistic Missile Division, and other officials of that division and SAC-MIKE; and Mr. Joseph W. Angell, Jr., chief of the USAF Historical Division Liaison Office. Their suggestions and their interpretations and explanations of many seeming discrepancies of fact were extremely helpful; their review and criticism of the original draft was invaluable.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT~~

~~SECRET~~
~~RESTRICTED DATA~~
~~ATOMIC ENERGY ACT 1954~~
CHRONOLOGY

Apr 46 AMC contracts with Convair for study and research on the MX-774 rocket missile.

Jun 47 MX-774 canceled.

16 Jan 51 USAF directs establishment of Atlas long-range rocket missile project MX-1593, with Convair as contractor.

16 Jun 53 Defense Secretary Wilson directs review of national missile program by ad hoc Special Study Group on Guided Missiles, with Trevor Gardner as chairman.

31 Oct 53 Trevor Gardner establishes Strategic Missiles Evaluation Committee (SMEC) under Dr. John von Neumann to review Air Force strategic missile program.

25 Jan 54 Special Study Group on Guided Missiles submits its report.

8 Feb 54 RAND study recommends reorientation and acceleration of Atlas development.

10 Feb 54 SMEC recommends reorientation and acceleration of Atlas development.

4 Mar 54 Aircraft and Weapons Board proposes an Atlas "crash" development.

11 Mar 54 Gardner recommends to Secretary of Air Force new organization structure for accelerated Atlas development.

15 Mar 54 Air Force Council concurs in Aircraft and Weapons Board recommendation of 4 March.

19 Mar 54 Air Force Secretary Talbott places Gardner in charge of Atlas project and directs Chief of Staff to reorient and accelerate Atlas development.

~~SECRET~~
~~SECRET~~

✱ 28 Mar 57 NSC and President approve USAF IOC force structure, to be available "at the earliest practicable date."

1 Apr 57 1st Missile Division and 392d Air Base Group activated under WDD.

May 57 Construction of Atlas facilities begins at Cooke AFB.

22 May 57 In an effort to keep defense expenditures down, Wilson directs a reduction in ballistic missile overtime costs.

27 May 57 AFBMC directs large overtime cost reduction.

1 Jun 57 WDD redesignated Air Force Ballistic Missile Division (AFBMD).

Jun 57 Construction of Titan facilities begins at Cooke AFB.

1 Jul 57 704th Strategic Missile Wing activated.

3 Jul 57 DOD officials brief NSC on national missile program. The latter adjudges it too costly.

31 Jul 57 Wilson submits proposals to NSC to revise ballistic missile program. These include the reduction of Titan's priority rating, the suspension of Thor production plans, and the selection of Thor or Jupiter at a later date as the IRBM system.

1 Aug 57 NSC and the President approve Wilson's proposals of the previous day.

7 & 9 Aug 57 USAF asks Wilson for less stringent program reductions, so that the ICBM IOC will be complete between June 1959 and October 1962 and the IRBM IOC between December 1959 and June 1961.

13 Aug 57 Wilson reduces Thor to an "R&D" project, cuts Thor overtime costs further, suspends or cancels Thor

~~SECRET~~
~~RESTRICTED DATA~~
~~FORMERLY SECRET~~

~~SECRET~~

ground support equipment contracts, and allows production of Thor sufficient only to supply flight-test requirements.

- 16 Aug 57 Wilson reduces planned Atlas production rate, relegates Titan to R&D status, and cuts further overtime allowances.
- 26 Aug 57 The Soviet Union announces the successful flight test of an ICBM.
- 12 Sep 57 At Wilson's request, AFBMD presents effects of latest program cuts and compares them with a more drastic reduction proposed by Wilson.
- 15 Sep 57 392d Missile Training Squadron (Thor) activated.
- 19 Sep 57 Wilson generally reaffirms his decisions of 13 and 16 August on the ICBM and IRBM programs, keeping Thor in indefinite status and postponing completion of the ICBM IOC by about 15 months.
- 4 Oct 57 The Soviet Union launches the earth's first artificial satellite--Sputnik I.
- 5 Oct 57 Wilson restates his 19 September directive but the objectives remain unchanged.
- 8 Oct 57 Gen. White asks Air Staff for new ballistic missile acceleration and augmentation plans.
- 9 Oct 57 BMD supplies preliminary data for accelerating and augmenting the ballistic missile program.
- 9 Oct 57 Neil McElroy replaces Wilson as Secretary of Defense.
- 10 Oct 57 NSC and the President call for early deployment of IRBM's with relaxed performance characteristics.
- 16 Oct 57 After reviewing ballistic missile plans to date, White directs preparation of new plans as part of an overall defense package.

~~SECRET~~

25 Oct 57 BMD supplies additional ballistic missile program planning data.

31 Oct 57 McElroy, in separate directives to USAF and the Army, rescinds certain restrictions on Thor and allows for the first time the development of Jupiter as a weapon system.

8 Nov 57 Air Force Secretary Douglas asks McElroy for the removal of all restrictions on Thor.

14 Nov 57 USAF overall defense package goes to DOD and NSC. Air Force asks for 18 Thor squadrons and advancement of the operational date for the first IOC squadron from December 1959 to August 1959 and of the fourth IOC squadron from January 1961 to May 1960. The Air Force also asks for nine Atlas and eight Titan squadrons and the advancement of IOC operational dates to between July 1959 and January 1962.

18 Nov 57 Douglas submits new IRBM IOC plan to DOD that would have the first squadron operational by June 1958 and the fourth by June 1959.

25 Nov 57 McElroy decides to put both Thor and Jupiter into production for operational employment.

26 Nov 57 The President approves the Thor and Jupiter plans.

27 Nov 57 DOD directs the Air Force and Army to deploy four squadrons each of Thor and Jupiter, to be operational between 31 December 1958 and March 1960.

27 Nov 57 AMC, ARDC, and SAC leaders meet at Wright-Patterson AFB at White's direction. They recommend the elimination of the special IOC procedures and the transfer of all IOC responsibilities to SAC.

29 Nov 57 White announces his decision to eliminate the IOC program.

3-6 Dec 57 ARDC and SAC officials work out arrangement for the

X

~~SECRET~~
~~RESTRICTED DATA~~
~~NO FORN DISSEM~~

~~SECRET~~

transfer of IOC training and operational responsibilities to SAC.

12 Dec 57 DOD approves, for planning purposes, nine Atlas squadrons as proposed by USAF on 14 November but keep Titan program at four squadrons.

20 Dec 57 USAF approves the ARDC-SAC proposal for the transfer of training and operational responsibilities.

21 Dec 57 British parliament approves the deployment of Thor to the UK.

31 Dec 57 ARDC and SAC draft the formal agreement of transfer of IOC responsibilities.

1 Jan 58 Transfer of training and operational responsibilities effected; SAC-MIKE established.

1 Jan 58 672d Strategic Missile Squadron (Thor) and 706th Strategic Missile Wing (Atlas) activated.

30 Jan 58 Third annual DOD briefing on ballistic missiles given to NSC and the President. They approve ballistic missile program as reoriented on 27 November and 12 December 1957.

	Page
CHRONOLOGY	iii
I. GENESIS OF THE LONG-RANGE BALLISTIC MISSILE	1
II. AIR FORCE ACCELERATION OF THE BALLISTIC MISSILE PROGRAM	5
III. NATIONAL PRIORITY FOR BALLISTIC MISSILES	14
IV. DEFINING THE INITIAL OPERATIONAL CAPABILITY (IOC)	27
V. THE ICBM IOC FORCE AND SCHEDULE	35
VI. THE IRBM IOC FORCE AND SCHEDULE	49
VII. THE SIX MONTHS BEFORE SPUTNIK	63
VIII. AFTERMATH OF SPUTNIK: ACCELERATION AND AUGMENTATION	74
IX. THE DEMISE OF THE IOC PROGRAM	89
FOOTNOTES.....	99
GLOSSARY.....	115
INDEX.....	118

~~SECRET~~

Chapter I

GENESIS OF THE LONG-RANGE BALLISTIC MISSILE

The Army Air Forces during World War II conducted experimentation on a variety of "guided missiles," more than 60 different types in all. By and large, the work consisted of adapting various guidance devices to existing weapons or aircraft. The Germans, on the other hand, emphasized the development of completely new guided weapons and succeeded, in the summer of 1944, in employing operationally the pulsejet V-1 "buzz bomb" and the rocket-powered V-2 ballistic missile.

The significance and potential of these and other German guided missiles was immediately realized by a band of enthusiasts within the AAF. *who* Before the close of the war, they began the formulation of a postwar long-term guided missile development program. By May 1945 the Air Staff had drafted military characteristics for a family of missiles covering all foreseeable requirements of the next decade. During the next several months, AAF headquarters released piecemeal to the Air Technical Service Command (ATSC) about one-half of these statements in all major categories: air defense, tactical air support, and strategic bombardment.¹

ATSC, starting in October, then solicited research proposals from industry. By the end of April 1946 the Air Materiel Command (AMC)*

* In March 1946 the Air Technical Service Command became the Air Materiel Command.

~~SECRET~~

~~RESTRICTED DATA~~

~~SECRET~~

2

had received the proposals, evaluated them, and let about 25 one-year research and study contracts for the several types of required missiles.²

One of the contractors was Consolidated-Vultee (Convair), selected to conduct a study on surface-to-surface strategic missiles capable of operating at ranges between 1,500 and 5,000 miles. Among others, Convair studied the feasibility of a rocket-propelled ballistic missile, and initial findings indicated the ultimate success of such a weapon, some eight to ten years in the future.³

Unfortunately, during December 1946, the AAF sustained a tremendous reduction in its missile development funds and anticipated another for fiscal year 1948. Accordingly, in line with retrenchment plans prepared by AMC on the basis of both finances and current technology, the AAF in June 1947 canceled Convair's contract. In lieu of the rocket missile, the AAF decided to rely initially on the speedy development of the Northrop jet-propelled subsonic Snark (and supersonic Boojum) and eventually on North American's development of a nuclear ramjet-propelled Navaho to meet strategic bombardment requirements. The AAF allowed Convair to use the remaining unexpended funds to complete and flight-test three research rocket vehicles then under construction and to continue studies on guidance and nose-cone re-entry.⁴

The Air Force attempted to resurrect the Convair project late

~~SECRET~~

~~RESTRICTED DATA~~

~~RESTRICTED DATA~~

USAF

~~SECRET~~

in 1948, but on a somewhat different basis. Earlier in the year, Convair had conducted three fairly satisfactory flights with the test vehicle, so the AAF proposed it for the role of the nation's high-altitude research vehicle. After comparing the vehicle's projected capabilities against those of the Navy's Viking, the Research and Development Board's Committee on Guided Missiles, in April 1949, decided to retain the Viking. The Air Force consequently dropped its proposal; Convair, however, continued to devote a limited amount of money and effort to rocket missile research.⁵

The Air Force renewed its interest in the application of rocket power to long-range missiles late in 1949 and 1950, following a series of studies by the RAND Corporation and several aeronautical firms. These studies indicated that advances in various technologies, particularly that of rocket propulsion, made a long-range rocket missile technically feasible. Late in 1950 the Air Force decided to pursue the matter further and, on 16 January 1951, authorized \$500,000, directing AMC to establish a study project with Convair.

The directive called for a two-phase study of a rocket missile with a minimum range of 5,500 nautical miles, a minimum speed of Mach 6 over the target, a circular probable error (CEP) of 1,500 feet, and a nuclear warhead. In the first phase, about six months in length, Convair was to determine the cost and time of development, the general

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

4

configuration, and the technical problems peculiar to both glide rocket and ballistic rocket missiles. Following Air Force selection of one or the other for the second-phase study, Convair would examine and attempt to fill gaps in the existing state of knowledge and so provide a firm base from which a development program could proceed at a later date.⁷

The Air Force maintained until 1954 the cautious approach outlined in the 16 January 1951 directive. Convair completed the first phase of the study on schedule, after which Air Force development officials in September 1951 chose the ballistic version for reasons of performance and cost. During the next few years the project, now designated MX-1593 or Atlas, remained a low-priority venture, accorded only routine attention, authorized a minimum of financial support, and beset with tremendous propulsion, guidance, and nose-cone re-entry problems. The technical difficulties resulted from the necessarily stringent propulsion and accuracy requirements stemming from the heavy weight and low-yield characteristics of then current atomic warheads.⁸

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY~~

~~SECRET~~

Chapter II

AIR FORCE ACCELERATION OF THE BALLISTIC MISSILE PROGRAM

In the spring of 1953, shortly after the Eisenhower Administration had come into office, Charles E. Wilson, newly appointed Secretary of Defense, imposed a 25-percent reduction on research and development funds budgeted for fiscal 1954. Several weeks later, during the Armed Forces Policy Council (AFPC) meeting of 16 June 1953, Wilson ordered an intensive review of the guided missile programs of the three services. The purpose was largely an economy measure and part of the "new look" and "more bang for the buck" philosophies recently announced by the new Administration. The reviewers were to identify and eliminate duplication of development effort and attempt to standardize on one missile to do the job of several in meeting the various operational requirements of the services.¹

Wilson designated Harold E. Talbott, Secretary of the Air Force, to organize and chair the interdepartmental study group. Talbott appointed his Special Assistant for Research and Development, Trevor Gardner, to conduct the review. A triservice group of generals and senior colonels, officially the Special Study Group on Guided Missiles, met during the next seven months and finally

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

6

rendered its formal report to the AFPC on 25 January 1954.²

During the course of the meetings, the group realized that the long-range strategic missiles presented technical problems far beyond those of missiles in general. Moreover, the development of long-range missiles was concentrated almost entirely in one service, the Air Force. Gardner therefore decided to form a special committee of leading scientists to evaluate the Air Force requirements and effort against the current state of technology and recommend measures to hasten the completion of development.³

Gardner's first step was to employ the recently established Ramo-Wooldridge Corporation to organize a working staff and secretariat. Then, on 31 October 1953, Gardner invited 11 outstanding university and industrial scientists to be members of the ad hoc group. Officially designated the Strategic Missiles Evaluation Committee (SMEC), the group also became known as the Teapot Committee or von Neumann Committee (after its chairman, Dr. John von Neumann).^{*4}

Gardner gave the SMEC a period of about four months to study its assignment and make a report. By late in January 1954 the committee had completed drafts of its findings and on 10 February,

* In addition to von Neumann, the SMEC included Clark B. Millikan, Charles C. Lauritsen, Louis G. Dunn, Hendrik W. Bode, Allan E. Puckett, George B. Kistiakowsky, J. B. Wiesner, Lawrence A. Hyland, Simon Ramo, and Dean Wooldridge.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

7

slightly ahead of schedule, forwarded the final report. Its contents were to have a notable effect not only on the Air Force but on the nation as a whole. As Gardner later commented, one purpose of the reviews by the Special Study Group on Guided Missiles and the Strategic Missiles Evaluation Committee had been to reduce costs. Instead, their recommendations called for a tremendous increase in missile expenditures.⁵

Gardner had formed the SMEC about the time that the Atomic Energy Commission (AEC) was in the final stages of developing a low-weight, high-yield thermonuclear device. Gardner realized the revolutionary effect that thermonuclear warheads could have on guided missiles, particularly the long-range strategic type. A preliminary Air Force Special Weapons Center (AFSWC) study of 15 September 1953 had pointed out the advantages of the new development. It seemed that Gardner wanted incontrovertible support from the scientific world. He obtained this not only from the SMEC but also from an independent RAND study dated two days earlier than the SMEC report.^{*6}

The substance of the several reports was dramatic insofar as it concerned the Atlas ballistic missile. Since the gross weight of the missile was almost a direct function of the weight of the warhead, the

* The SMEC had access to the draft RAND report and used much of the material in the preparation of its own findings and recommendations.

~~SECRET~~
~~SECRET~~

~~RESTRICTED DATA~~

~~Atomic Energy Commission~~

light weight of a thermonuclear warhead (possibly as low as 1,500 pounds) would allow the reduction of the overall weight of Atlas by as much as one-half. The reduction in weight meant a reduction in the number of rocket engines required to obtain the desired ranges. The high-yield aspects of the new warhead would permit broadening the specified CEP from 1,500 feet to three miles, thereby greatly simplifying the requirements placed on the guidance system. As a result, shortening the missile's development period from three to five years and attaining a small operational force by 1962-63 appeared likely and reasonable. Several SMEC members even thought that a preliminary or "PHD" system, one that did not meet all the stated military characteristics and that required contractor technicians to assist in the launching operation, was a logical possibility sometime between mid-1958 and mid-1960.⁷

Even before SMEC had submitted its formal report, Gardner began his enthusiastic and relentless push to revamp the Air Force missile program. Meeting with Gen. Nathan F. Twining, Air Force Chief of Staff, On 27 January 1954, Gardner criticized the quality of the missile program, especially the strategic portion. He labeled current military characteristics as "unnecessarily complex, and occasionally impossible, specifications," especially those concerning CEP's, payloads, and guidance. Gardner felt that the missile

~~SECRET~~

program lacked adequate top-management attention, that development and production plans were unrealistic, and that the Air Force was not properly organized in the missile field. In conclusion, Gardner called for action to revamp the content and organization of the missile program in general and of the Atlas project in particular.⁸

In other contacts with Talbott and with Department of Defense (DOD) officials, Gardner sought quick and positive action on the SMEC recommendations. He emphasized not only the encouraging technical prospects but also the committee's feeling, based on inconclusive briefings by four governmental intelligence agencies, that the Soviet Union might have forged well ahead in the ballistic missile field.

??
()

Talbott immediately approved the preparation of an overall plan to accelerate ballistic missile development. Donald A. Quarles, Assistant Secretary of Defense for Research and Development, met on 16 February with Gardner and leading Air Staff development officials, noted his concurrence for a broad technical reorientation in line with the SMEC report, and asked the Air Force to refer its technical plan of action, when ready, to his Coordinating Committee on Guided Missiles (CCGM).⁹

Gardner proceeded with a series of conferences that included Air Staff officials and representatives from the Air Research and Development Command (ARDC), the SMEC, and Convair. The

~~RESTRICTED DATA~~
~~TOP SECRET~~

~~SECRET~~

10

special assistant reported on 11 March to both Talbott and Twining the consensus of the conferees that the current Air Force organizational structure was inadequate to deal with the matter at hand.

Gardner then made the following recommendations:

In order to achieve a preliminary IBMS [Intercontinental Ballistic Missile System] capability between June 1958 and June 1960, the Air Force will have to dramatize the acceleration of the program and simplify the normal controls and channels of coordination within the Air Force through the assignment of a high ranking military officer to be placed in charge of the program with unusual channels of communications and a strong directive.

Gardner also prophetically noted the necessity of obtaining Joint Chiefs of Staff (JCS), AFPC, and National Security Council (NSC) support and interest.¹⁰

Talbott reacted with dispatch. On 19 March he designated Gardner as his direct representative with responsibility to act in all aspects of the Atlas program. At the same time, the Secretary directed Twining to institute measures to carry out the recommendations contained in the 10 February SMEC report and in Gardner's 11 March memorandum. Talbott warned that "the achievement of an operational intercontinental ballistic missile system by 1958-1960 will require top level support and vigorous emphasis at all levels."¹¹

The importance, urgency, and possibilities of the ballistic program seemed to have deeply impressed the Air Staff, even before

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT-1954~~

~~SECRET~~

11

Talbott's 19 March dictum. At the 4 March meeting of the Aircraft and Weapons Board, the members received a briefing on the content and significance of the SMEC report from the development and intelligence staffs, quickly adopted the SMEC recommendations, and proposed a "crash" program. The board so notified the Air Force Council (AFC) on 9 March.¹²

The AFC took up the subject at meetings on 11 and 15 March 1954. At the close of its deliberations, the council also called for "extraordinary action" to accelerate the project as well as the establishment of a special organization to carry out the work. General Twining approved the AFC recommendation but prohibited discussions with DOD agencies "until the Air Force is firmly established, organization wise, to fully exploit the Atlas Program."¹³

Did Twining have reservation?

Twining's injunction was impossible to carry out in view of Quarles' request of February that the Air Force keep his CCGM informed. On 15 March the Air Force briefed the coordinating committee on preliminary Atlas plans, and the latter quickly approved. Early in April, Gardner made a similar presentation to the AFPC, who referred the matter to Quarles for followup. However, as a result of the briefing, Roger M. Keyes, Deputy Secretary of Defense, on 9 April directed Talbott to push Atlas "with all practicable speed." Keyes also reported that the Central Intelligence

Did Talbott have reservation?

~~SECRET~~

~~RESTRICTED DATA~~

~~TRANS-EMERGENCY~~

SECRET

12

Agency (CIA) would prepare an estimate of Soviet capabilities and intentions in the ballistic field so that DOD officials could orient the Atlas program with due regard to possible Soviet actions.¹⁴

The Air Staff continued to move with haste. In April the Chief of Staff established the Office of the Assistant Chief of Staff for Guided Missiles. In May he assigned the Atlas the highest Air Force priority, with a precedence over everything else. In the next month, Lt. Gen. Donald L. Putt, Deputy Chief of Staff for Development, created within his area of interest a special office for Atlas. Other deputy chiefs of staff designated project officers.¹⁵

On 21 June 1954, Putt formally directed ARDC to reorient and accelerate Atlas development. The directive provided for establishment of an ARDC field office on the west coast, under a general officer who would have authority and control over all aspects of the program. ARDC soon created the Western Development Division (WDD) at Inglewood, Calif., with Brig. Gen. Bernard A. Schriever in charge, and directed that the new division assume control over the ballistic program on 15 August. During the remainder of the year, the WDD and a special advisory committee worked out a unique management arrangement, with Ramo-Wooldridge Corporation as the system engineering and technical director and with Convair, North American Aviation,

SECRET

RESTRICTED DATA

ATOMIC ENERGY ACT-1954

SECRET

13

and other major subsystem developers as associate contractors. The division also settled on the missile's basic configuration and drafted preliminary development, test, and financial plans.¹⁶

At year's end, Gardner and von Neumann briefed Wilson, Talbott, and their staffs on the status of the Atlas program. The substance of opinion at the close of the meeting was that Atlas should continue to be "pushed," that it was progressing as fast as possible under prevailing peacetime conditions, that current "bottlenecks" were primarily technical, and finally that the National Security Council should be appraised of the "significance and urgency of the project."¹⁷

SECRET

RESTRICTED DATA

ATOMIC ENERGY ACT-1954

~~SECRET~~

Chapter III

NATIONAL PRIORITY FOR BALLISTIC MISSILES

Gardner on several occasions had suggested the necessity of interesting the President and his staff on the importance and urgency of the ballistic program. He renewed this effort in the form of a mid-1955 status report to Talbott. Gardner judged the Air Force's unique management and organization^{al} structure as functioning excellently to date. Both the Atlas and Titan projects (the Air Force had established the latter in May 1955 as a backup or insurance measure) were progressing on schedule. But this was not enough. In Gardner's opinion, achievement of an early operational capability was the nation's most urgent and challenging technological task. If the Soviet Union gained the ballistic capability first, the result would be most disastrous to this country. "There must be," Gardner warned, "a national awareness and understanding of the real significance of the attainment by the United States--or by the Soviets--of an operational ICBM [Intercontinental Ballistic Missile] capability in a thermonuclear age." Gardner explained that "by 'national awareness' I mean vigorous backing of the project by the Congress and by the President in order to assure that the peacetime checks and balances which are necessary in our system of government

where did this notion come from?

~~SECRET~~

will not be the cause of time delays in the accelerated progress of the program."

Gardner proposed several actions that he deemed essential in obtaining the proper national recognition for the Atlas-Titan effort. Among these suggestions were the following: the immediate briefing of the President and Congress on the gravity of the ballistic missile situation, the establishment of streamlined policy- and decision-making bodies at levels above the Air Force, the assignment of the highest national priority rating to Atlas and Titan, and the funding of the two missiles as an entirely separate matter within the national budget.

Gardner forwarded his report to Talbott on 29 June. At that time, he noted that he had presented much the same information to the Subcommittee on Military Applications of the Joint Congressional Committee on Atomic Energy. This had occurred on 25 May in response to Senator Henry M. Jackson's queries on the ballistic program. Gardner proposed that Talbott send Jackson a copy of his (Gardner's) report.¹

Possibly Gardner had already done what he proposed that Talbott do. Perhaps it was coincidence. At any rate, the next day (30 June), Jackson, chairman of the aforementioned subcommittee, and Senator Clinton P. Anderson, chairman of the parent committee,

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

16

sent a letter to the President in which they raised much the same points that Gardner had done with Talbott. Emphasizing their fears that the Russians were far ahead in the ballistic competition, the two senators warned that the probable consequences of losing the race were a breakup of our European alliance--a victim to atomic blackmail--and the outbreak of war in which the United States could not effectively retaliate. Anderson and Jackson suggested the placement of the ballistic program on a wartime footing, the assignment of the highest national priority, and the institution of the other measures proposed one day earlier by Gardner.²

On 20 July 1955, Senators Henry M. Jackson and Clinton P. Anderson sent a letter to President Eisenhower.

The President forwarded the Anderson-Jackson letter to Wilson on 1 July 1955, along with the advice that he would meet with the Secretary of Defense on 6 July to discuss the subject. Hurried conferences among Wilson, Talbott, and Air Staff officials, plus a special briefing by Schriever, culminated in a meeting of the President, Wilson, and Talbott on the scheduled date. The President directed that he and the NSC be briefed on the ballistic program in general and on the points raised by Anderson and Jackson in particular. Because of the upcoming summit conference at Geneva, the President set the date of presentation for late July or early August.³

The urgent and grave aspects of the ballistic program had gradually been filtering to the top Government levels through another

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

17

avenue. In the fall of 1954, the President had approved the conduct of a study of the nation's current defense measures by the Technological Capabilities Panel (TCP) of the Science Advisory Committee, Office of Defense Management (ODM). On 14 February 1955 the panel, headed by James R. Killian, reported its findings and recommendations to the President, who turned them over to the National Security Council for consideration. The NSC reviewed the TCP report at its 17 March meeting and then sent it to the several interested Executive Department agencies for study, comment, and recommendation. The Department of Defense supplied its views on 3 June. By 26 July the NSC Planning Board had consolidated the various comments and readied a list of recommendations for action at the next NSC meeting, scheduled for 4 August.⁴

How did Killian come to interface w/ the NSC? what was Anderson's role?

Killian's panel had proposed, among a host of other items pertaining to the nation's security, that the NSC formally recognize the Air Force ballistic missile program as a national effort of the highest priority, in order that it be given the very substantial support so necessary for an early development completion date. In effect, the panel proposed a "Manhattan" operation outside the Department of Defense. The group also advanced in the strongest terms the idea of concurrent development of a 1,500-mile ballistic missile.⁵

Thus, the Killian Report of 14 February and the Anderson-

~~SECRET~~

~~RESTRICTED DATA~~

~~FORMAL ENEMY INFORMATION~~

Jackson letter of 30 June afforded two avenues of gaining increased stature and recognition for the ballistic missile program. By the late summer of 1955, the substance of one had become integrated with that of the other and, in concert, ultimately led to the desired objective.

On 28 July, DOD representatives briefed the President and the NSC on the ICBM program. A week later, on 4 August, the council discussed the contents of both the 26 July NSC Planning Board document and the 28 July briefing. Based upon the council's deliberations and conclusions at this meeting, the Planning Board drafted a policy statement on the ballistic program for final action and approval.⁶

The draft policy statement forecast the "gravest repercussions" should the Soviet Union obtain an intercontinental ballistic missile capability substantially in advance of the United States. In view of Soviet progress, development of the American missile was "a matter of great urgency." Accordingly, the work was to have "the highest priority," and the Secretary of Defense was to prosecute the program "with all practicable speed."⁷

The Joint Chiefs of Staff considered the proposed policy on 2 September 1955 and informed Wilson of its agreement on the draft's content. The NSC reviewed the policy statement on

~~RESTRICTED~~

ATOMIC ENERGY ACT 1954

~~SECRET~~

certain points, the revised Gillette Report went to Gardner on 14 October. Gardner generally accepted the recommendations, although he proposed that the Secretary of Defense also create at his level a committee as a single point of contact and decision-making body. Gardner's report, titled the Air Force Plan for Simplifying Administrative Procedures for the ICBM, went to Wilson on 25 October. The Secretary accepted the plan virtually unchanged. On 8 November 1955, he instituted the necessary procedural and organization changes within his office, including the creation of the Office of the Secretary of Defense Ballistic Missiles Committee (OSD-BMC). At the same time, Wilson directed the three subordinate departments to take similar steps.¹²

The Wilson directives started a chain reaction within the Air Force. Quarles on 14 November formed the Air Force Ballistic Missiles Committee (AFBMC) and directed the Chief of Staff to issue "with all possible speed" the necessary orders to carry out the purpose and intent of the Gillette findings. Four days later, Gen. Thomas D. White, Vice Chief of Staff, issued directives to the Air Staff and the field commands on the new priorities and procedures established for the ballistic program.¹³

While the ICBM's were securing the highest national

~~SECRET~~
~~RESTRICTED DATA~~

~~TECHNOLOGICAL DATA~~
~~NO RELEASE TO THE PUBLIC~~

priority rating, their junior partners--the medium-range ballistic missiles (MRBM's), subsequently redesignated the intermediate-range ballistic missiles (IRBM's)--came upon the scene and soon obtained a similar rating. Each of the services had individually studied several versions of such a missile for a number of years, but none had gone beyond the study status. ~~However,~~ In its

14 February 1955 report, the Technological Capabilities Panel emphasized both the military worth of a 1,500-mile ballistic missile and the political and psychological advantages accruing to the Russians should they possess the weapon in advance of the western world. The panel thought the IRBM could be available far sooner than the ICBM (perhaps by as much as five years) and suggested that the United States embark on its development as quickly as possible. ¹⁴

of the Scientific
Advisory Comm.
1948 of Defense
Under Dr.
James Killian

The Department of Defense, in its 3 June 1955 comments on the Killian Report, concurred in principle with the panel's recommendations on the IRBM and noted that it was then considering the merits of five different proposals from the services. The five included a byproduct or "fall-out" of the Atlas program, another Air Force proposal, an American-adapted British ballistic missile, and two Navy-suggested versions. The DOD promised to make a full report to the NSC not later than 1 December 1955 on

~~SECRET~~~~RESTRICTED DATA~~

steps taken to obtain an operational IRBM. The NSC at its 4 August meeting accepted the DOD-proposed schedule.¹⁵

The move to develop an IRBM signaled the start of a raging controversy among the JCS, the three services, and several other DOD agencies. At stake was the choice of a particular project for development and, perhaps more importantly, the selection of a service (or services) to operate the missile. The assignment of both development and operational responsibilities was "on the block," and none of the services meant to be left out.

The battle of words continued throughout the months of September and October, finally ending in the fashion of so many of the earlier missile disputes--in a compromise. It was a compromise not completely satisfactory to any of the services and, more significantly, not completely satisfactory as the solution to the problem at hand.

Initially, the JCS found itself split in the traditional manner on missile matters: the Air Force on one side; the Army and Navy on the other. The Air Force claimed the right to develop and operate the IRBM in support of its strategic bombardment functions but conceded the Navy's operational requirement for a ship-launched version. The Army and Navy claimed all three services required the missile but that they (the Army and Navy) should develop it,

~~RESTRICTED DATA~~
~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

using the highly experienced personnel and facilities available at Redstone Arsenal. When the services showed little inclination to change their positions, Adm. Arthur W. Radford, the JCS chairman, suggested an alternative: the development of two IRBM missiles-- one by the Air Force and another jointly by the Army and Navy--and their use by the Air Force and Navy, respectively. The Air Force quickly noted its general agreement to Radford's proposal, and then the Navy followed suit. As a result, the memorandum that went to Wilson on 2 November 1955 contained an Air Force-Navy view, supported by Radford, and an Army view which in fact was the old Army-Navy position.¹⁶

Wilson generally accepted the majority view, and on 8 November he announced his decision as part of the directive that established the separate and novel administrative and management structure in the ballistic field. He pointed to the necessity for the IRBM at an early date and stated his belief that the nation possessed the latent technical capability to develop the IRBM concurrently with the ICBM and complete it before the ICBM. On 8 Nov 1955, Wilson then assigned development responsibility for a land-based IRBM (IRBM #1 or Thor) to the Air Force and for a ship-based IRBM (IRBM #2 or Jupiter) to the Army and Navy. (The IRBM #2 was also to serve as a

~~RESTRICTED DATA~~
~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

25

backup to IRBM #1.)^{*} Finally, the Defense chief reported his intention of recommending that the NSC assign the IRBM a national priority rating equal to that of the ICBM, "but with no interference to the valid requirements of the ICBM program." Pending NSC action, the IRBM's would have a priority second only to the ICBM within DOD.¹⁷

At its 1 December 1955 meeting, the NSC noted the substantial progress in the ballistic field, as well as the President's recent statement that the political and psychological impact of an operational IRBM on the world would be so great that its early development was of critical importance to the national security of the United States. The NSC then acted on the priority rating for the IRBM. The President, after further discussions with Wilson, conferred the rating of "highest priority above all others" on the IRBM development programs, placing them on equal status with the ICBM's.¹⁸

Shortly after the President's announcement of 1 December 1955, the Air Staff stated its opposition to the coequal priority ratings accorded the two types of ballistic missiles. Some Air

* When the Navy decided about one year later that it could not employ the liquid ballistic missile profitably, the DOD authorized the development of the solid-propellant Polaris. The Army then continued Jupiter as a backup to the Air Force's Thor.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

26

Staff members thought the ICBM was of far greater importance to the nation's security and feared interservice and intraservice competition would cause interference, delays, and dilution of talent and facilities. Moreover, scheduled development completion dates of the ICBM and IRBM were only months apart, but the IRBM required deployment overseas--a time-consuming and difficult task--and might actually lag the ICBM in becoming operational. Twining forwarded the Air Staff views to Quarles on 6 February 1956 and suggested that the latter attempt to have the President's directive modified. The next day, Quarles informally sent the Air Force position to Wilson, who apparently closed the matter without further action.¹⁹

*The next day Gardner
RESIGNED! Why was
this omitted?*

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT-1954~~

~~SECRET~~

Chapter IV

DEFINING THE INITIAL OPERATIONAL CAPABILITY (IOC)

As earlier noted, the Air Force and the Department of Defense introduced a number of new administrative and management policies and procedures for the highly accelerated ballistic program. The establishment of ballistic missile committees at the Defense and Air Force departmental levels (OSD-BMC and AFBMC, respectively) and the concentration of decision-making functions in these committees were outstanding examples. Another was the use of an annual development plan as a single authoritative document for conducting the program. Yet another innovation was the reliance on annual incremental funding. The virtual elimination of the Air Staff from the chain of decision was certainly a change of tremendous import. The creation of a special field office with a special "systems director" was also unique. The substitution of a philosophy of simultaneous action in many areas--development, production, supply, training, operations, and the like--in lieu of the time-honored sequential, step-by-step system was perhaps an important a change as any. And there were many others.¹

The sole objective of the new arrangements was the attainment of an operational weapon system at the earliest possible date.

~~SECRET~~
~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

28

Defense officials, faced with reports of rapid Russian progress, had emphasized from the first the urgent requirement for an early ballistic missile operational capability. Beginning with the issuance of the SMEC report on 10 February 1954 and continuing through the authorization of the "highest priority" rating in the last months of 1955, they justified almost every action on this requirement. In line with these moves, the process of "fielding" an operational system also underwent close examination and received special treatment.

Several SMEC members had suggested that a preliminary ICBM operational capability some time between June 1958 and June 1960 was reasonably possible. Gardner and Talbott had quickly accepted this possibility and established it as an objective. However, it was not until the preparation of the Gillette Report during September-October 1955 that the concept of an initial operational capability--in part the preliminary operational capability of the SMEC report--was first broached in detail. It seemed likely that the concept emanated from WDD planners but that Gardner was its chief proponent even though he was not a member of the Gillette group.²

The Gillette Committee proposed that the Chief of Staff extend ARDC responsibility, which already included the preparation of an ICBM operational concept and operational plan, to include all steps leading to an initial operational capability. Only after Air Force leaders decided

~~SECRET~~

~~RESTRICTED DATA~~

~~EXCLUDED FROM AUTOMATIC DOWNGRADING AND DECLASSIFICATION~~

~~SECRET~~

29

that an ICBM unit was combat ready would control and command pass to the Strategic Air Command (SAC). The reasons set forth by the committee were that "the intimate relationship of research and development with preproduction items, prototype bases, and training and operational procedures in a program of maximum urgency in a completely unique environment, call [sic] for a single authority to assure time phasing of all elements."³

The Gillette group withheld firm recommendations on the IRBM (Thor) initial operational capability, since it involved remote (other than continental United States) launching bases. The matter of assignment was then under study within the Air Staff, so the committee only emphasized the necessity of an early decision. The selection and construction of at least two foreign bases would probably be a time-consuming process, and lack of immediate resolution could lead to delays in deployment and operational attainment."⁴

On 18 November 1955, in line with Quarles' directive to carry out the Gillette recommendations, General White notified ARDC that "the immediate goal of the ICBM effort is the earliest possible attainment of an initial operational capability." He explained that the IOC "is envisaged as one which would provide a capability of operationally employing prototype weapons during the latter phase of the development program," and would include one or two prototype

~~SECRET~~

~~RESTRICTED DATA~~

~~ITAMS ENERGY NOT 1001~~

~~SECRET~~

30

bases.

White also listed the reasons for giving ARDC the job of putting the ICBM IOC force together. Initially, the ICBM would probably incorporate certain marginal technical features. Early subsystems would undoubtedly undergo considerable revision and change as development progressed. "These developmental considerations," White noted, "will have dictatorial influence over many aspects of operations, training, logistics, etc., as related to the initial operational capability." Flexibility of action and singular direction of the plan were prime requisites, and Air Force headquarters believed that ARDC could best provide them.⁵

White informed the other field commands of the ICBM IOC plan on the same day. He ordered them to render maximum support and assistance to ARDC. Moreover, each command with an active or support role was to establish an ICBM project office directly responsible to its commander. White specifically directed SAC, as the IOC operator, to establish the closest possible working relationship with ARDC "to assure that results are compatible with strategic operational requirements."⁶

It took considerably more time to resolve the assignment of responsibility for the IRBM initial operational capability. A major issue was whether to designate the IRBM a tactical or strategic

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

31

missile and then select the user command(s) on that basis. In past years and in the mid-1955 call for a development plan, the Air Force had referred to the missile in question as the tactical ballistic missile (or TBM). In defending its right to a 1,500-mile ballistic missile before JCS and DOD, however, the Air Force had emphasized the missile's worth to the strategic bombardment mission.

As a step in resolving the designation and assignment problem, the Directorate of Operations on 26 January 1956 queried SAC for its views. SAC quickly proposed itself as the IRBM operator, although with considerable justification. The command claimed that the assignment of the IRBM to SAC would ease problems of command and control (unified under SAC instead of split among several overseas theaters and international agencies), would simplify war planning and target coordination, and would benefit SAC's role in the ICBM program. These reasons were sufficient to gain General White's approval, on 20 February. Several days later the Deputy Chief of Staff, Operations (DCS/O) notified the several commands that the IRBM was now considered a strategic missile, with SAC as its operator.⁷

White's decision had resolved the problem of IRBM operational responsibility, but several questions concerning an IRBM initial operational capability still remained. First and foremost was whether there should be an IRBM IOC force; secondly, who should have the job

~~SECRET~~

~~RESTRICTED DATA~~

~~ITOMIO ENERGY AG-1951~~

~~SECRET~~

32

of putting the force together. There was some Air Staff feeling against the IRBM IOC scheme, especially if it involved ARDC. The basis for this stand came from the fear that ARDC was already too deeply engaged in ICBM and IRBM development as well as the ICBM IOC. The added responsibility for the IRBM IOC would only tend to dilute ARDC's managerial and technical talent to the detriment of both missiles.⁸

DCS/O nevertheless proceeded on the assumption that an IRBM IOC was desirable. On 17 February 1956 the Directorate of Operations asked both ARDC and SAC for their comments on the proposed assignment of IRBM IOC responsibility to the former. The development command replied that it felt the use of the ICBM IOC procedures for the IRBM represented "a valid and desirable solution." SAC agreed, except that it wanted responsibility for locating the IRBM operational sites.⁹

Further discussion among the three parties led to an agreement wherein ARDC would have responsibility for all IRBM IOC actions within the continental United States while SAC had the same role for all overseas activity. On 21 March the Directorate of Operations proposed the split-responsibility plan, justifying the development of an initial operational capability with the same reasons White had listed in his 18 November 1955 announcement for the ICBM IOC. The next day, Headquarters USAF notified the two commands and directed them to

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~
draw up a joint agreement for the Chief of Staff's approval.¹⁰

In mid-April, Lt. Gen. Thomas S. Power, ARDC commander, reported that preliminary ARDC-SAC discussions had disclosed no areas of disagreement on the IRBM IOC approach or on the division of responsibility. On 7 May 1956, Power and Gen. Curtis E. LeMay, SAC chief, approved the formal agreement. After a detailed examination and several minor changes, Headquarters USAF on 25 July noted its concurrence.¹¹

In retrospect, the ICBM and IRBM initial operational capability plans were emergency measures. Operational prototype versions of the ballistic missiles were to be produced in sizable quantities and then placed on operational status, even before development flight-testing was complete. In the case of the ICBM and, to a lesser degree, of the IRBM, extremely costly and complex base construction, planned with little or no prior knowledge, was necessary at an unusually early date because of long lead time--as much as three years. Training organizations and equipment were nonexistent, and makeshift arrangements were inevitable. Contractors would have to create suitable "go-no-go" test equipment concurrently with the development of the multitude of subsystems, components, and accessories that made up a ballistic missile. *

The Air Force as a whole had no real experience in the

~~SECRET~~
~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

34

operation of the revolutionary ballistic missiles nor in the creation of operational forces to employ the deadly weapon. The only competence available, limited as it was, to the Air Force was concentrated in ARDC and, more particularly, in its Western Development Division. This was the basic and overriding reason for the peculiar organization and management structure called for in the initial operational capability concept--to centralize in one agency, the Western Development Division, virtually all of the authority and responsibility for functions normally delegated to ARDC, SAC, AMC, and the Air Training Command (ATC). These commands would, however, work closely with WDD.

The end product of this extraordinary step was to be the creation of a force of prototype weapons at an early date reasonably reliable and capable of operations to counter possible Russian weapons and to play a meaningful role in the nation's philosophy of deterrence.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

Chapter V

THE ICBM IOC FORCE AND SCHEDULE

It took about 18 months after the Air Force had accelerated its ballistic missile work for the Administration to accord the program the highest national priority rating. It would take about the same length of time thereafter for the Air Force to run the gantlet of its own departmental officials, DOD officials, and the top Administration leaders in obtaining formal recognition of the ICBM initial operational capability plan and approval of the IOC force and time schedule.

General White's directive of 18 November 1955, assigning responsibility for the ICBM initial operational capability to ARDC, did not state the size of the force nor the time schedule for attaining operational status. Nevertheless, when ARDC on 14 December passed the directive on to WDD, the latter was not entirely unprepared. The division had been studying the numerous facets of an operational concept almost since its establishment, so by 20 December it was able to give top ARDC, AMC, ATC, and SAC leaders a briefing on ICBM operational, logistic, personnel, and installation matters and offer recommendations on the force structure and operational dates.¹

Based in part on WDD's recommendations and in part on "weapons-on-the-target" requirements and other strategic considerations,

the Air Staff outlined the desired size of the ICBM IOC force and specified dates for its operational availability. On 28 December, White informed ARDC of these requirements. The ICBM initial operational capability would consist of one wing with three bases, each having 40 missiles and 20 launching positions. Because of the early operational dates, the bases, one each in the eastern, central, and western United States, were to be on Government-owned land where builders could conduct their construction work on a year-round basis. SAC would coordinate and Headquarters USAF approve ARDC site selections and base facility designs.²

The time element also dictated that the bases be "soft," that is, without protection from nuclear explosive effects. Survival and retaliation would depend on dispersion of the launchers, local air defenses, and quick reaction time. White defined the last as a capability for each base to launch 10 missiles within 15 minutes after an alert warning and another 10 within two hours.* The schedule called for 10 operational missiles in place by 1 April 1959, and the entire ICBM IOC force of 120 missiles and 60 launchers ready by 1 January 1960.³

* In February 1956, Headquarters USAF stated that the remaining 50 percent of the operational inventory should be launched within the following two hours. (Revised Preliminary Operational Concept for the ICBM, by Operations Control Division, DCS/O, 27 Feb 56.)

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

White's directive was essentially explicit about the how, when, and where of the ICBM initial operational capability. The Air Staff had considered projected technological, production, training, and construction factors as best it could in establishing the size and operational dates. On the other hand, important political and financial aspects at the national level were somewhat outside the direct province of the Air Staff and, under any circumstance, extremely difficult to assess. Consequently, the scope and schedule for the initial operational capability was destined to fluctuate constantly in tune with the ever changing outlook in international affairs, the nation's financial status, and the advances and delays of technology.

WDD completed preparation of a ballistic missile development plan within days after Wilson's 8 November 1955 acceleration directive and before issuance of the two White directives on the ICBM IOC. Thus, the plan which the AFBMC reviewed and approved when first it met on 23 November contained little reference to an initial operational capability. The committee stated at that time that it wanted a detailed ICBM IOC plan by April 1956.⁴

WDD completed the plan on schedule and sent it to Air Force headquarters on 19 March. Much to the concern of Air Staff members, the plan differed markedly from the objectives contained in White's directives of 18 November and 28 December 1955. In brief, WDD

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

38

feared that missiles built to meet the current ICBM IOC schedule would not fly. The division therefore proposed a slight delay in the operational date for the first missiles but a slippage of more than a year in the IOC completion date. In this way, the contractor would build up the production rate slowly, allowing the incorporation of essential modifications during assembly. The Air Staff nevertheless maintained its original stand. Faced with this disagreement, Schriever on 29 March asked the AFBMC for another 60 to 90 days before submitting the ICBM IOC plan. The committee agreed to wait until mid-June.⁵

The differences between WDD and the Air Staff remained unsettled, even after 4 May 1956 when General White voiced his displeasure with WDD's failure to follow his earlier guidance. White stated that he had considered WDD's views but still thought there was insufficient reason to deviate from the directed schedule. Accordingly, ARDC was to submit "as soon as possible" an ICBM IOC program plan designed to meet the originally stated requirements.⁶

Possibly before he learned of the latest White views, Schriever on 7 May briefed Power and LeMay on the status of the ballistic program. Both commanders then dispatched strong pleas supporting WDD. Power claimed that attainment of the current ICBM IOC goal was impractical, both from a technical and an operational standpoint. The ARDC chief

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

39

contended that the IOC force would consist of operationally unsuitable guidance equipment and untested, unmodified "development" missiles. Proper training equipment would not be available, slowing the personnel buildup. Power thought that a low production rate initially would allow the introduction of essential technical corrections before too many missiles had come off the assembly line. Using expedited but realistic lead times, Power claimed, the earliest practicable attainment of the 120-missile ICBM IOC force was about March 1961--more than a year behind the current schedule. Power asked relief from the 28 December directive and permission to present the revised plan in mid-June.⁷

LeMay on 17 May strongly seconded Power's position. The SAC leader emphasized that to obtain the required production buildup, the WDD would have to freeze designs and commit the ICBM to production before the contractor could flight-test the first missile. This step would negate the entire purpose of a test program and eliminate essential modifications from the early "operational" missiles. LeMay thought it was more realistic to establish IOC dates in relation to the already compressed development schedules rather than to tailor the development and production programs to the operational dates.⁸

Between the dispatch of the Power message (9 May) and the LeMay letter (17 May), General White heard a briefing from an ARDC-WDD team. Finally convinced of the validity of WDD's position, White

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

40

reversed his stand. On 23 May, he notified Power, LeMay, and Schriever of his agreement to the ICBM IOC program changes: 25 operational missiles in place by 1 January 1960 and 120 missiles in the inventory by March 1961, to consist of two groups of SM-65 Atlas and one group of SM-68 Titan employing 72 launching pads and 24 guidance stations. White directed ARDC to ready a detailed plan by 15 June, after which he would make necessary changes to his 1955 directives.⁹

White's approval constituted successful clearance of only the first hurdle for the ICBM IOC plan. The next involved the AFBMC-- the sole decision-making body on ballistic matters within the Department of the Air Force. To date, the committee had received no presentation of IOC plans nor passed judgment on the concept.

On 14 June 1956, Schriever forwarded the detailed IOC plans to the Chief of Staff. It contained substantially what WDD had proposed to Power, LeMay, and White earlier in May. Four days later, ARDC representatives briefed a joint session of the Air Force Council and the Aircraft and Weapons Board, then followed with a similar presentation to Air Staff representatives. Comments subsequently solicited from the Air Staff revealed general concurrence with the plan and agreement that it was ready for AFBMC consideration.¹⁰

The AFBMC took up the ICBM IOC plan at its 3 July 1956

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

meeting. The committee--more specifically, its chairman, Secretary Quarles--found little favorable in the plan other than the final IOC inventory of 120 missiles. The magnitude of IOC funding for fiscal 1957--about \$178,300,000--was of most concern. Quarles repeatedly stated a desire for rescheduling certain actions to later dates to allow funding in subsequent fiscal years. Lead times, presented as compressed to the utmost, were not accepted as realistic in some instances. Quarles favored slipping the IOC completion date to the end of 1961, examining the feasibility of deleting either Atlas or Titan, and concentrating initially on the construction of the projected training-operational base alone. The Air Force Secretary prohibited the construction of production facilities beyond those necessary for the development program and demanded more austere features for ICBM base facilities.

At the close of the six-hour meeting, Quarles withheld approval of the ICBM IOC plan and directed it be reoriented along a "poor man's approach," to incorporate the many suggestions made earlier in the session. Quarles allowed three months to prepare the revision, asking WDD to submit the new plan in September 1956.¹¹

The Assistant Chief of Staff for Guided Missiles, Maj. Gen. Samuel R. Brentnall, advised the Chief of Staff on 6 July and again in mid-August to rebut Quarles' position. Brentnall pointed to the

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

42

NSC action of September 1955 calling for an ICBM operational capability "at the earliest possible date," to the military requirement for a force sufficient in size so as to constitute a realistic war deterrent, and to the probable ICBM imbalance between the United States and the Soviet Union by about 1960. General White, however, decided against a direct assault, relying on an overall program cost-saving study under way at WDD to allow retention of the major IOC objectives.¹²

After WDD and its contractors conducted a three-week exhaustive survey of their current and future effort, the division prepared an overall program presentation, including the ICBM IOC portion, for AFBMC's annual review. Much to the consternation of Air Staff officials, the program cost estimates for the coming fiscal year had increased greatly in spite of Quarles' demand for a reduction. In the matter of the IOC, WDD recommended a program containing certain cost-saving features but keeping the old basic objective: a 120-missile ICBM operational inventory by March 1961.¹³

The Air Staff studied the WDD program during the early weeks of September, and then on the 24th of that month the Air Force Council examined it. The AFC largely agreed with the contents of the program but realized reductions were necessary in line with Quarles' demands. The council, noting that NSC had never specified the size of the IOC force, recommended the deletion of one of the three ICBM IOC groups

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

and one of the three operational bases while keeping the previously scheduled end-date and quick reaction features. In this way, a considerable savings in funds would result, although not immediately. General White, as AFC chairman, agreed only with the greatest reluctance because financial rather than military considerations were the determining factor. Twining on 26 September approved the council's recommendations.¹⁴

The AFBMC on 27 September 1956 heard WDD's program plan and quickly rejected it "because of the indicated magnitude of resources required." The committee accepted, however, the Air Staff proposal to cut the ICBM IOC force and base structure. Once again, the AFBMC returned the plan, directing restudy and resubmission at a lower cost figure. The committee directed that in the ICBM IOC portion of the study "activation dates of initial operational units would remain unchanged."¹⁵

With the assistance of Headquarters USAF, WDD succeeded in cutting almost 25 percent from the previous fiscal year 1958 budget estimate. After the Air Staff had commented on the revised program, AFC quickly approved it on 8 November. Twining added his concurrence at the same time, remarking that the program cost and objectives were "as low as we dare go." Two days later, the AFBMC found the revision generally to its liking, and on 16 November Quarles approved. After

~~SECRET~~
~~RESTRICTED DATA~~
~~ITOMC-2000-107-100~~

more than six months, the ICBM IOC plan had finally cleared the second hurdle, drastically scarred but still retaining some major parts of the original objective.¹⁶

The OSD-BMC received notification of the Air Force program on 23 November 1956. After receiving an explanatory presentation from Schriever, the DOD committee on 5 December approved the program "in principle." The annual DOD ballistic missile briefing for the NSC and the President followed, on 11 January 1957. The NSC generally accepted the program, but the President warned that this action did not constitute approval for a specific number of ICBM IOC units and missiles. The President directed that DOD first prepare a report on the relative military advantages of ballistic missiles in comparison with aircraft and other-than-ballistic missiles. Finally, the President emphasized that all future major changes to the ballistic program would require NSC's and his concurrence.¹⁷

The President's remarks left the ICBM IOC plan still "up in the air." The next day, Quarles attempted to obtain a firm decision on force structure and schedule. He asked Wilson to forward a request for NSC Planning Board and NSC consideration. When, after a period of several weeks, Wilson took no action, the DOD Special Assistant for Guided Missiles, ^{Eger} ~~Edgar~~ V. Murphree, reopened the subject. Pointing to the need to determine the scope and rate of production, training, and

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

logistic activity, Murphree suggested that a decision was essential within the next few months. Wilson so informed the President on 23 March 1957.¹⁸

At its 28 March meeting, with the President in attendance, the NSC heard a special IOC briefing from Quarles and concurred in its contents. The President then added his approval to the plans for achieving an operational capability "at the earliest practicable date."¹⁹ Thus the ICBM IOC scheme had finally gained authorization at the highest level--some 18 months and many, many changes later.

Originally, the Air Force had based the formulation of its plan for an ICBM initial operational capability on NSC's advice to achieve the objective "at the earliest possible date" and on the assumption the Administration would furnish adequate financial support. It soon became apparent that such was not the case, and that economy of expenditure was indeed a major factor. In time, the Administration manifested its zealously for keeping costs down in Quarles' several refusals to accept proposed plans despite valid military requirements and, even more concretely, in his and Wilson's willingness to cut the ICBM IOC force by one-third. They took these actions in the face of reports on the Soviet Union's rapid progress in this same field. The President's acceptance of the smaller force, to be attained "at the earliest practicable date,"

*
How do you account for it?

~~SECRET~~
~~RESTRICTED DATA~~
~~NO FORN DISSEM~~

~~SECRET~~

46

✓ in a sense constituted the final capitulation to economy. There was considerable difference in meaning and emphasis between "earliest possible date" and "earliest practicable date."

The directive which Headquarters USAF sent to ARDC on 5 March 1957 for the first time officially superseded the earlier and long-time obsolete IOC directives of 18 November and 28 December 1955. Headquarters redefined the ICBM IOC force as one wing with two groups (one Atlas and one Titan). Each group would consist of four combat squadrons, each possessing 10 missiles, 6 launchers, and 2 guidance stations. One Atlas squadron and one-half of another were to be located at a combined training-operational base, the remainder of the Atlas force at an operational base. A second operational base would house the four Titan squadrons.

Measures to survive an enemy attack and then retaliate included dispersion of squadrons, protective hardening of operational facilities, and quick launching reaction. Headquarters exempted the training-operational base from the hardening requirement because of insufficient time and required hardening of the two operational bases only if no delay ensued in operational attainment. Reaction time remained as before: 25 percent of the ICBM IOC missile inventory launched within 15 minutes of an alert, another 25 percent within two hours of the warning, and the remainder within four hours.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

The directive also contained new criteria for use in locating the two operational bases. Another unique feature concerned operational control and command responsibilities. While the operational control of each ICBM would pass to SAC as soon as the vehicle possessed the requisite crew, support equipment, and capability for being launched, command of the units would remain with ARDC until it had developed the entire initial operational capability.

The final portion of the directive dealt with time schedules. Briefly, an initial increment (one launching complex of 3 launchers, 1 guidance station, and 6 missiles) was to be operational in March 1959 at the combined training-operational base. The remainder of the eight-squadron force would be operational by March 1961. However, the eighth squadron would not have received its full complement of Titan missiles by that date.²⁰

A comparison of the ICBM IOC plan of May 1956 and the "economy" version approved in March 1957 revealed several interesting facts. The Air Force had managed to retain and, in fact, improve on the original schedule by planning to obtain a tiny operational capability in March 1959 and a complete initial operational capability in March 1961. To be sure, the first increment of capability was primarily a token one--six missiles and three launchers. In contrast to the successful defense on scheduling, the ICBM IOC

~~SECRET~~~~RESTRICTED DATA~~~~FORMS ENCL 107-1051~~

~~SECRET~~

force would suffer a cut to 80 from the initially planned 120, utilizing two instead of three operational bases. The Administration had in effect neatly stretched out the ICBM IOC plan without affecting the overall time period. In that period, Convair and Martin would produce only two-thirds of the originally desired missiles, thereby relieving the need for a high production rate as well as expanded production facilities. In like fashion, the stretch-out brought relief to the time and financial pressures relating to requirements for personnel, training, construction, and ground support and other equipment. The primary objective was purely and simply the conservation of funds.

~~SECRET~~

~~RESTRICTED DATA~~
~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

Chapter VI

THE IRBM IOC FORCE AND SCHEDULE

Planning the IRBM initial operational capability and obtaining approval for it at the several governmental levels of decision was in most respects a repetition of the ICBM IOC activity. During much of the period, action on the two IOC's occurred concurrently and with considerable interplay. There were, however, several features peculiar only to the IRBM IOC. Among these were the already noted split-responsibility assignment to ARDC and SAC, the matter of negotiations with the British for overseas bases, and a short-lived pre-IOC or emergency capability plan.

The Air Staff first disclosed in mid-February 1956 its thinking on the size and schedule of the IRBM initial operational capability, at the time the Directorate of Operations sought ARDC and SAC comments on dividing the IOC responsibilities. *22 March 1956* The Air Staff on the basis of military requirements suggested a one-wing IRBM IOC force, housed at three bases in the United Kingdom (UK). A base would contain four launching sites, each with five launchers. In all, the IOC force would consist of 120 prototype IRBM's and 60 launchers. Schedules called for 10 missiles in combat status by October 1958; the whole of the IOC force by 1 July 1959. Headquarters

~~SECRET~~

~~RESTRICTED DATA~~

~~SECRET~~

USAF made these goals official on 22 March 1956.¹

SAC and ARDC leaders on 7 May agreed on the detailed division of the IRBM IOC responsibility. ARDC would develop, man, train, and equip the force (a wing with eight squadrons). SAC's role included the deployment of the force and achievement of an operational status overseas. The selection and construction of the required base sites was also a SAC job.²

On the same day that the two commanders made their agreement, WDD officials briefed Power and LeMay on the chances of meeting the IRBM IOC objectives listed in the 22 March directive. The outlook was not particularly bright. The schedule required a high rate of production at an early date, long before the contractor would have conducted much of the flight evaluation program. Moreover, there was the diplomatic problem of acquiring oversea bases and the technical problem of constructing the launching and support facilities. With current long lead times, even the most austere and "soft" facilities required an immediate start on construction.

The WDD team in a 15 May 1956 briefing and LeMay in his 17 May letter both emphasized to General White the production and construction difficulties. They pressed for an IRBM IOC completion date one year later--from the originally directed date of 1 July 1959 to 1 July 1960. Instead of having the entire force of 120 missiles

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

51

deployed by 1 July 1959, WDD and SAC thought it feasible to have only 30 in position for "anger" launchings. Headquarters USAF approved the revised IRBM plan, allowing a more gradual production buildup and more time for base construction.³

The Western Development Division submitted the first detailed IRBM IOC plan on 14 June 1956. It called for eight squadrons, each equipped with 15 missiles and 15 launchers. SAC would start deployment in March 1959, have two squadrons operationally ready by July 1959, and the remainder by July 1960. To alleviate the long lead construction and equipage time at least in part, SAC intended to use several of its United Kingdom bases as Thor sites. Quick reaction requirements specified the launching of 25 percent of the force within 15 minutes of an alert, another 25 percent within two hours, and the other 50 percent within four hours. WDD would conduct training at a still-to-be-selected base in the United States.⁴

The plan quickly received concurrence from the Air Staff, Aircraft and Weapons Board, and AFC. It then encountered on 3 July the opposition of the AFBMC, particularly from the chairman, Secretary Quarles. As in the case of the ICBM, Quarles directed reorientation of the IRBM program to the "poor man's approach." The objective was to conserve funds especially during fiscal years 1957 and 1958, by stretching end dates and buildups into succeeding

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

52

years. AFBMC wanted a revised plan by September 1956.⁵

The IRBM initial operational capability plan submitted by WDD in June was, for two reasons, an "austerity" plan. Except for the airframe, the IRBM weapon system derived most of its major subsystems and components from the ICBM development program. In this light, the IRBM development effort constituted but a small fraction of the overall ballistic missile program costs. Secondly, in view of the stringent deadline, base construction costs were to be kept at a low level by the use of existing SAC bases in the United Kingdom and by depending upon "soft" rather than "hard" or protected launching and support facilities.⁶

It was not surprising therefore that the revised IRBM plan forwarded by WDD early in September differed little from the one rejected by AFBMC in July. The AFC studied the plan on 24 September as a part of the whole ballistic program plan prepared for AFBMC's annual review. Although it recommended a one-third cut in the ICBM IOC force, the council proposed retention of the original IRBM force and schedule--eight squadrons (120 missiles) operational overseas by July 1960.⁷

The AFBMC on 27 September 1956 quickly rejected the entire ballistic program plan, including that portion on the IRBM initial operational capability, "because of the indicated magnitude of

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

resources required." The committee directed the prompt preparation of a program plan substantially lower in cost. In the case of the IRBM, Quarles stated that the only thing "sacred" was the time schedule.⁸

Early the next month, Air Staff, ARDC, and AMC officials worked out a new IRBM arrangement. Essentially, they decided to retain the IRBM IOC schedule but to reduce the size of the force by 50 percent. The AFC examined the revised plan on 8 November, and the AFBMC followed suit two days later. The committee found the new proposal generally satisfactory, and on 16 November 1956 Quarles approved it. For the first time, an IRBM IOC plan had successfully negotiated the hurdle at the Air Force departmental level.⁹

The OSD-BMC next took up the IRBM plan. After Schriever, on 5 December, briefed the committee in detail, the DOD group approved the plan "in principle." The NSC then received a presentation at its 11 January 1957 meeting and expressed its satisfaction with the plan. However, the President at that time stated the NSC action did not constitute specific approval for the size and schedule of the IRBM IOC force. Although Quarles attempted the next day to obtain a firm Presidential assent, it was not until 28 March that the NSC ~~and the President obliged.~~ The President ratified the requirement for the four-squadron IRBM force but "at the earliest practicable date" instead of the previously stated "earliest possible date."¹⁰

SECRET

RESTRICTED DATA

~~SECRET~~

54

Meanwhile, expecting Presidential approval of the IRBM IOC plan and force structure momentarily, Headquarters USAF on 5 March 1957 formally superseded its original directive of the previous March and listed the new IRBM IOC provisions and requirements. They were basically a restatement of the WDD proposal of November 1956.

The IRBM IOC force was to consist of one United Kingdom-based wing with four squadrons, each possessing 15 missiles and five launching positions (with three launchers at each position). Because of the established deadlines, the IOC bases would not be hardened. Their survival depended on dispersion of the launching positions and a quick reaction capability. The latter remained unchanged from the original requirement.

The new directive stated that transfer of units between ARDC and SAC would occur in accordance with their 7 May 1956 agreement. Once a unit successfully passed an operational readiness test at the training base, SAC would assume responsibility for deployment to and operational attainment at the oversea base. The first squadron was scheduled to deploy in March 1959 and be operational in July; the fourth squadron was to be operational a year later.* Finally,

* This was a six-month advance in the IOC completion date as proposed by WDD in November 1956. However, the division had suggested the advanced date provided sufficient funds were made available for certain additional training facilities. The AFBMC and OSD-BMC subsequently approved the request for funds. (Memo, D. A. Quarles, SAF, to OSD-BMC, subj: Revision to ICBM/IRBM Development Plan, 4 Jan 57.)

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

Headquarters USAF warned that an alternate plan of action, in which the British would play an as-yet-undetermined role, was under study.¹¹

After more than a year of planning, an IRBM IOC plan had finally gained the successive approval of AFBMC, OSD-BMC, NSC, and the President. The adopted plan differed radically from the original, being only one-half the size; the schedule, however, remained substantially the same. As in the case of the ICBM IOC, the net effect was to stretch out the original program without affecting the beginning and ending dates. Production rates would stay low, with existing production facilities able to supply the requisite number of missiles on schedule. The cost of the IRBM IOC force would be considerably lower, although unit cost would be higher. Nevertheless, the Administration's objective of lessening the pressures on the national debt would have been gained. In the final analysis, "economy" was again the major factor in determining the size and schedule of the IRBM initial operational capability.

While the various levels of the Government had studied the IRBM IOC plan, there was also under consideration a scheme which the Air Force termed "The IRBM Emergency Capability Plan." On 10 November 1956, when the AFBMC finally went along with the latest version of the IRBM IOC plan, the committee asked for a special study on the feasibility of establishing a pre-IOC force of three to six Thor missiles. The motivation was obviously political in nature, for a

~~SECRET~~

56

force of that size could have little other value.¹²

The Western Development Division supplied the details of such a scheme on 24 December. The division stated that a capability to launch three to five missiles from the United Kingdom by 1 July 1958--one year ahead of the current IOC schedule--was technically feasible. It meant the use of "development" (not production prototype) missiles, contractor and "R&D" personnel, and early versions of ground support equipment. Establishment of the limited capability would be a major effort, involving both the United States and the United Kingdom and demanding immediate resolution of site selection and construction matters.¹³

In passing the contents of the plan to Headquarters USAF, General Power on 28 December 1956 stated that the emergency plan appeared feasible. He also added this comment:¹⁴

It should also be noted that the emergency capability will not represent a true military capability. Also this fact, in all probability, will be known to Soviet intelligence. This is considered pertinent in evaluating the political and psychological value of the emergency capability in relationship to our NATO /North Atlantic Treaty Organization/ allies.

The reaction of Air Staff members to the emergency plan was somewhat mixed. They questioned the military worth of this extremely costly emergency capability. Some doubted that any "weapon-on-target" capability would result because of the necessarily

~~SECRET~~

~~RESTRICTED DATA~~

~~ARMED DANGER RGT-1954~~

~~SECRET~~

57

low order of reliability combined with the missile's slow reaction characteristics at this point in its development. There was also to be considered the likely adverse effect of the extra effort on the already heavily compressed IRBM development schedule.

A number of advantages appeared on the other side of the ledger. Large propaganda dividends could probably result from the establishment of the tiny ballistic force. There was a likelihood that the emergency proposal would speed up the completion of current base negotiations with the British. The experience accruing from the emergency effort would greatly assist in the establishment of the IRBM IOC force.¹⁵

After weighing the pros and cons of the matter, General White accepted the Air Staff recommendation to proceed with the emergency plan. White on 9 January 1957 forwarded to Quarles the WDD plan, along with a listing of the advantages and disadvantages. Two weeks later, Quarles sent the material on to Wilson, suggesting its approval. Wilson proved amenable to carrying out the scheme.¹⁶

The emergency plan became a part of the overall package used in the American-British negotiations during the early months of 1957. Unfortunately, resolution of the matter of IRBM employment and bases was not immediately forthcoming. On the other hand, WDD had premised the emergency capability schedule on a 1 February 1957

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

58

go-ahead date. When more than five weeks had elapsed after that deadline, Air Force representatives explained to DOD officials that the chief merit of the plan was the one-year time advantage that it enjoyed over the IRBM IOC schedule. However, the emergency operational date had been slipping since 1 February and would continue to do so day by day until the two nations reached an accord. Consequently, the desirability of the emergency plan decreased daily.¹⁷

The American government on 18 April sent the British a draft version of a proposed joint agreement. Although the document contained provisions for establishment of the emergency capability, the Air Force by that time had already given up on the plan. On 29 March, White had informed Quarles and the AFBMC that at this point the expected marginal returns did not warrant the further diversion of effort and money. Quarles reluctantly agreed on 5 April. Air Force headquarters on 26 April 1957 notified the interested field agencies of the IRBM emergency capability plan's demise.^{*18}

From the inception of IRBM IOC planning early in 1956, the Air Force had pointed to the long lead time involved in the design, construction, and equipping of launching bases and had continuously urged the early resolution of all questions concerning the selection

* On the American-British governmental level, the plan remained alive until an October 1957 draft of the proposed joint agreement superseded the 18 April version.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT-1954~~

~~SECRET~~

59

and use of sites in the United Kingdom. The required intergovernmental agreements were, however, not formally concluded until two years later. By that time, international and British political factors had caused considerable realignment in the Air Force's IRBM IOC plan. Even when the U. S. administration in March 1957 officially recognized and approved the IRBM IOC objectives, the impact of the political factors had already been felt.

The original Air Force plan of early 1956 envisaged the deployment of American-manned squadrons to several SAC bases in the United Kingdom. It was obvious that this action required British agreement, and in April 1956 Quarles requested Wilson to apprise the Department of State of the IRBM plans.¹⁹

Little else was done on the matter of obtaining base rights in the United Kingdom until after the middle of 1956, when Quarles informally discussed American plans with the British defense and supply ministries. In August, the Air Force Secretary received word of British willingness to negotiate.²⁰ The discussions continued throughout the remainder of 1956 in somewhat informal fashion. It was soon apparent that the British, for obvious political reasons, wanted an active rather than a supporting role in the venture, to the point of manning some of the IOC squadrons.

At the sixth AFBMC meeting on 10 November 1956, when

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

60

the committee for the first time approved the detailed IRBM IOC plan, Quarles reported that the British might operate the Thor weapon system in the United Kingdom in lieu of or in cooperation with the Air Force. Accordingly, the committee directed the preparation of an alternate plan wherein British personnel manned either the first or subsequent United Kingdom-based Thor units. Quarles emphasized, however, that the Air Force should maintain the IOC schedule under any circumstance.²¹

By the year's end, the Air Staff and the interested field agencies had worked out a tentative plan which they thought most suitable for preserving the IRBM IOC deadline. The plan envisaged the deployment of two American-manned squadrons, followed by two British squadrons, and finally by the replacement of American personnel in the first two squadrons by British airmen.²² SAC registered opposition to this scheme, wanting to retain command and operational control over all Thor squadrons, regardless of their nationality. If this were turned down, the strategic command would settle for permanent control of the two American squadrons.²³ The request was unavailing.

Discussions during January 1957 culminated in several days of meetings between Wilson and Duncan Sandys, the British defense minister. Both accepted the step-by-step plan proposed by the Air

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

61

Force. On 1 February, Wilson sent Sandys a draft version of a proposed agreement covering the plan itself, the number of sites required, and the delineation of American and British responsibilities for construction, training, funding, and the like.²⁴

The next step in reaching the required agreements involved discussions at the government-to-government level. As part of their talks at the Bermuda conference of late March 1957, the President and Harold Macmillan, the British prime minister, ratified the understanding reached by Wilson and Sandys on the deployment and operation of the IRBM IOC force in the United Kingdom.²⁵ As earlier noted, immediately after his return from Bermuda, the President for the first time officially recognized and authorized the IOC force structure and schedule.

The Air Force had started its IRBM IOC planning in February 1956 with the expectation of quickly attaining a sizable force of operational missiles. Although it managed to keep a reasonable semblance of the original schedule, the Air Force was unable to avert the consequences resulting in large measure from the wielding of the Administration's economy axe. Thus, 50 percent of the planned force fell by the wayside.

The IRBM IOC plan also became, in part, a victim of British internal politics. Here again, it appeared that the Air Force

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

62

could for a time retain entire responsibility for at least 50 percent of the force--the first two IOC squadrons. In short order, however, British pressure would force further adjustments that virtually eliminated Air Force personnel from the manning and operation of all IRBM IOC squadrons. Finally, and quite significantly, negotiations up to and including the Bermuda conference of March 1957 had failed in actually pinning down the selection of specific bases and in spelling out the multitude of details incident to the establishment of an initial operational capability on British soil. Those particular tasks would consume additional months of waiting and discussion.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

Chapter VII

THE SIX MONTHS BEFORE SPUTNIK

The ICBM and IRBM initial operational capability plans evolved by the Air Force, concurred in by the AFBMC on 10 November 1956 and eventually approved by the several successively higher echelons of government, reflected in large measure the current stringent "economy" attitude of the Administration. To be sure, such factors as the world situation, probable Soviet ballistic missile progress, ICBM and IRBM technical development schedules, and extant war deterrent forces had also been examined in arriving at the stated level of financial support, the size of the IOC forces, and the operational schedules. The Air Force therefore felt reasonably confident in proceeding toward fiscal year 1958 on the basis of the objectives approved by the Administration.

The confidence quickly disappeared under a rash of new Administration moves, most of them financial in nature. The Air Force soon faced the prospect of conducting an approved ballistic program with funds substantially less than the original estimates. After meeting this imposition, the Air Force encountered even stricter fiscal directives that led in the fall of 1957 to a period when there was, for all intents and purposes, no approved ballistic program. ✓

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

64

The Thor-Jupiter dispute, brewing since late in 1956 and gradually intensifying with each passing month, added to the confusion and to the utter decimation of the Thor program plans. The final blow came during the period between the Russian announcement of a successful ICBM flight test in late August 1957 and the 4 October launching of Sputnik I. Wilson directed a revision of the Air Force ballistic missile program altering drastically the IOC plans. The primary purpose was to cut expenditures once again.

The Air Force ballistic program approved for fiscal year 1958 required about \$1,338,000,000. In granting their approval, higher echelons went along with the program objectives but decreed a reduction of \$200,000,000 in the supporting budget estimates. After considerable study during April and May 1957, the Air Force formulated a financial plan which coincided with the lower fund figure for budgetary purposes but still managed to preserve the basic IOC objectives. The AFBMC declared the plan in consonance with both the financial and strategic policies of the nation and approved it on 27 May 1957.¹

Even as the Air Force struggled with the fiscal year 1958 financial plan, Wilson was in the midst of attempting to resolve another major fiscal problem. It seemed that the national debt would at any moment exceed the authorized ceiling. The Administration therefore had to keep a close watch on expenditures. Unhappily, the rate of

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

defense spending during the spring of 1957 far exceeded the planned rate and threatened to endanger the Administration's objective of staying under the debt ceiling.

In an effort to lower the rate to the desired level, Wilson in May 1957 directed the military departments to slow down contractor deliveries, cancel or drastically prune contractor overtime authorizations, and delay payments. On 22 May, Wilson ordered the OSD-BMC to examine specifically the overtime costs of the ballistic missile program. While the study was still under way, the AFBMC on 27 May established an overtime goal in an effort to reduce the current 13.8 percent to 8 percent (ratio of overtime hours to total hours). The OSD-BMC went along with the cutback on 16 July after completing its own study.²

The financial actions taken by the Air Force during the last weeks of fiscal year 1957 failed to lessen the Administration's pressure. Defense department spokesmen on 3 July 1957 briefed the National Security Council on the nation's missile program. According to General White, the NSC found the cost too steep in the light of other national requirements. Subsequent informal discussions between Air Force and DOD missile officials disclosed Wilson's intent to reduce drastically the strategic missile program,* with ballistic

* In addition to the Atlas, Titan, and Thor, the other strategic missiles were Jupiter, Polaris, Rascal, Goose, Quail, Snark, B-52 air-to-surface (Hound Dog), and the just-then terminated Navaho.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

66

costs in particular to be lowered to about \$1,000,000,000. The Air Force's three-missile program alone was above that figure while Wilson's estimate was to apply to the Jupiter and Polaris as well. Under this reduced program, only Atlas would retain its "highest" national priority rating.³

Late in July, Wilson sent the NSC a list of proposed changes to the ballistic missile program. Although not as drastic as hinted earlier in the month, the proposals were nevertheless quite severe. Wilson wanted to continue Atlas at the highest priority level but reduce Titan's rating, curtail still further authorized contractor overtime, and suspend Thor production until a special DOD committee evaluation of both the Thor and Jupiter had provided recommendations for a single land-based IRBM program. The NSC and the President on 1 August 1957 concurred in Wilson's plan, recognizing that a delay in the IRBM IOC schedule would result from the Thor-Jupiter evaluation.⁴

Meanwhile the Air Force had begun studies on how to counter in whole or in part the moves against the ballistic program. General White on 19 July directed the Air Force Ballistic Missile Division (AFBMD)* to prepare a plan based on a financial figure below that

* The Western Development Division became the Air Force Ballistic Missile Division on 1 June 1957.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

67

currently required and to study the effects on the IOC schedules.

AFBMD supplied the information in short order.⁵

On 6 August, armed with the AFBMD data but apparently without knowledge of the NSC actions of 1 August, White appealed to Douglas, Air Force Secretary since May, to intercede with Wilson. White emphasized that any reduction in the missile program was unwise; however, if Wilson still demanded the cuts, the Air Force rather than the DOD should, as a matter of principle, devise ways of getting down to the required level.

White discussed the ballistic program in detail. Under the approved IOC plans, the monthly rate of production to meet operational dates would be 6 Atlas, 7 Titan, and 6 Thor. At this 6-7-6 rate of production, the last of eight ICBM IOC squadrons would become operational in March 1961. The fourth Thor IOC squadron would attain similar status in July 1960. If forced to do so, the Air Force could reduce planned production to a rate of four-per-month for each of the missiles. The major result, in addition to the savings feature, would be a delay in completing the IOC force.

White pointed to the firm NSC requirement of 28 March 1957 for the 12-squadron IOC force "at the earliest practicable date." Any change in objectives required the council's concurrence. Congressional ratification of any proposed change was also in order,

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

68

in line with a House Committee on Appropriations directive which had specifically recommended against any ballistic program cuts. Finally, White noted the extensive Russian ballistic missile program under way. Intelligence reports indicated frequent test launchings as well as the planned start of quantity production by the early 1960's. The Air Force Chief of Staff* concluded that, in the light of the Soviet threat and the firm NSC and congressional guidance, the ballistic program should not be reduced. If the Administration nevertheless considered the move essential, the reduction should not extend below a figure sufficient to support an IOC program based on a 4-4-4 production rate.⁶

This appeal of White's was followed immediately by meetings of the DOD and Air Force top hierarchy on 7 and 9 August. Schriever made a comparative evaluation of the current 6-7-6 program and the 4-4-4 plan. Assuming that DOD directed the reduction, Schriever estimated the following delays in the IOC schedule:

	<u>Approved 6-7-6 Plan</u>	<u>Proposed 4-4-4 Plan</u>
Atlas first operational capability	March 1959	June 1959
Atlas IOC completion	March 1961	October 1961
Titan first operational capability	October 1960	August 1961
Titan IOC completion	July 1961	October 1962
Thor first operational capability	June 1959	December 1959
Thor IOC completion	June 1960	June 1961

* White had succeeded Twining as Chief of Staff on 1 July 1957.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

69

Wilson at this time verbally ordered three actions in keeping with the NSC directives of 1 August. The Air Force would reduce the Thor program to an "R&D" level with a monthly production rate of two--an amount sufficient only to supply flight-test requirements. The production restriction would remain until DOD had decided on either Thor or Jupiter as the nation's land-based IRBM. Secondly, Wilson directed the Air Force to study the effects of a two-per-month production limit on Atlas, Titan, and Thor IOC plans and schedules. Lastly, Wilson wanted Schriever to refine the 4-4-4 plan for re-presentation early in September.⁷

Wilson reinforced and broadened the verbal directives with two documents, on 13 and 16 August. In the first, Wilson reiterated that Thor production restrictions would remain until DOD resolved the Thor-Jupiter problem. Additionally, the Air Force was to cancel or suspend ground support and training equipment contracts. As a final blow, Wilson cut the authorized overtime figure from 8 to 3 percent.⁸

Wilson's second directive--on 16 August--dealt primarily with the ICBM's. In the case of Atlas, the Secretary of Defense allowed the proposed Air Force plan (with a four-per-month production rate) to stand temporarily, pending completion and decision on Wilson's two-per-month proposal. Titan did not fare so well. Wilson imposed the two-per-month rate, effective immediately, although subject to

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

change as a result of the planned September briefing. In a sense, Wilson had relegated Titan to the same status accorded the Thor. The Atlas, as well as the Titan, project came under the stringent overtime limitations earlier placed on Thor.⁹

The directives wiped out entirely the IOC schedules guarded so carefully by the Air Force through the many months leading to the presidential approval of March 1957. As Schriever stated to his ARDC chief, "I consider that we do not at this time have an approved FY 58 program as represented in our development plan." He feared that the tremendous cutback would create extremely serious management and morale problems both at the Ballistic Missile Division and with all of its contractors.¹⁰

AFBMD had the refined plan ready early in September 1957. Representatives briefed LeMay (Air Force Vice Chief of Staff since 1 July) and the Air Staff on 9 September and the AFBMC on 11 September. They went along with the 4-4-4 plan but labeled the 2-2-2 alternative as wholly unacceptable. Wilson and his top missile aides heard the details of the two plans on 12 September.¹¹

Schriever showed various development, production, and IOC dates under both plans. A comparison with the March 1957 approved plan and the August proposed plan revealed major deteriorations in each of the three IOC schedules:¹²

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

71

	<u>Approved 6-7-6 Plan (Mar 57)</u>	<u>Proposed 4-4-4 Plan (Aug 57)</u>	<u>Proposed 4-4-4 Plan (Sep 57)</u>	<u>Proposed 2-2-2 Plan (Sep 57)</u>
Atlas first operational capability	Mar 59	Jul 59	Jul 59	Oct 60
Atlas IOC completion	Mar 61	Oct 61	Oct 61	Sep 64
Titan first operational capability	Oct 60	Aug 61	Nov 61	Dec 62
Titan IOC completion	Jul 61	Oct 62	Oct 62	Sep 65
Thor first operational capability	Jun 59	Dec 59	Jul 60	Oct 61
Thor IOC completion	Jun 60	Jun 61	Jan 62	Mar 66

Schriever also explained the apparent discrepancies between the 4-4-4 plans of August and September. In the case of Titan, the slippage stemmed from the addition of a "hedge" factor for the construction of hardened launching facilities plus the relegation of the project to R&D status. With Thor, the later operational dates were due to several reasons. The major one was the assumption that DOD would not select Thor or Jupiter and give the "go-ahead" signal until January 1958. (The August plan had been premised on an August go-ahead at the four-per-month rate.) The cancellation or suspension of certain supporting contracts also affected the IOC dates adversely.

13

Throughout the meeting, Wilson and his deputy (Quarles) emphasized the funding problems generated by the Administration's

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

determination to keep within specified expenditure rates and so avoid breaking through the debt ceiling. Although he made no definite decisions at this time, Wilson appeared to go along with most of the 4-4-4 plan rather than the 2-2-2 alternative.¹⁴

On 17 September Douglas asked Wilson to approve the Atlas and Titan programs as presented the week before and release the funds to meet the new IOC schedules. Douglas of course said nothing of Thor inasmuch as the decision on the Thor-Jupiter dispute was still a matter of the future.¹⁵ Wilson obliged on 19 September but couched his answer so broadly that there was possibility of misunderstanding it. Therefore, on 5 October, Wilson substituted a more specific and detailed version.¹⁶

Briefly, Atlas was to have a three-launcher complex operational by July 1959 and the four-squadron IOC force by October 1961. Operational dates for the first Titan element and for the four-squadron IOC force were November 1961 and October 1962, respectively. Initial dates for the two missiles had slipped three months and 13 months, respectively, and IOC completion dates were set back eight months for Atlas and 15 months for Titan. The Titan project also dropped to a priority rating below that accorded Atlas, Thor, and Jupiter.¹⁷

During 1956 and the early months of 1957 the Air Force had

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

formulated and gained approval for its IOC plans and schedules only by sacrificing large portions of the then contemplated force. In obtaining the approval, however, the Air Force successfully protected the operational schedule. Under the steadily intensifying financial pressures of the following months, even this advantage went by the boards. At a time when the Soviet Union announced the successful flight of its ICBM and placed Sputnik I into orbit, the Air Force endured the hardships of further Administration-imposed economy measures. These led directly to delays in the ICBM IOC schedules and to the degradation of the Thor development-production-operational program to one of development alone. Adding to the generally discouraging Thor picture was the nonexistence of a formal detailed agreement between the United States and the United Kingdom on the selection and construction of bases, the training of personnel, and operational control of the missile. Six months had already elapsed since the Bermuda conference, and there appeared little chance of settlement until the Administration had resolved the Thor-Jupiter controversy and the British had settled their internal political differences.

unfair

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

Chapter VIII

AFTERMATH OF SPUTNIK: ACCELERATION AND AUGMENTATION

The Russian announcement of late August 1957 on the successful flight test of an ICBM made little impression upon governmental or congressional leaders or upon the American public. The 4 October launching of Sputnik I, followed on 3 November by Sputnik II, provided a rude awakening. Although some in high places made statements to the contrary, most realized the Russian feats for what they really were and what they signified: concrete proof of the Soviet Union's extremely advanced state of technology, providing credence to earlier claims about IRBM's and ICBM's.

In a real sense, the Communists had again furnished the United States with the necessary stimulus to action. Once before, in June 1950, after a half-decade of waning interest in and support to the armed forces, Communist actions had forced sharp increases in American defense activities.

By the fall of 1957 the nation was again reverting slowly but surely to "form." There had been little doubt in 1954 that conditions demanded the expedited development of an operational force of ballistic missiles. The President had met this demand in 1955 with his formal "highest priority above all others" for the missile force.

~~SECRET~~

75

However, this action seemed to signal the resumption of the dreary process of gradually but constantly withholding necessary support from the overall ballistic program, although the development portion did not suffer appreciably. First, the Administration reduced the IOC force objectives by more than one-half, although the military requirements remained. It then stretched out the schedules for what remained to a point almost beyond recognition.

The Russian Sputnik, coming just at the completion of the latest program reduction, caused an abrupt reversal in the unfortunate trend. As Neil McElroy, who replaced Wilson shortly after the Sputnik launching, noted in his first monthly ballistic missile report to the President: the reprogramming started in August and continuing through September and October ~~was~~ now of "historical interest" only.¹

Within the Department of Defense, officials studied, examined, and weighed many plans for accelerating and augmenting the current ballistic missile force and schedule objectives. There had to be a general reevaluation of both the IRBM and ICBM programs. The former included the Air Force Thor and the Army Jupiter and therefore involved interservice interests; the latter was concerned primarily with the Air Force Atlas and Titan and for that reason was certain to be simpler in its high-level policy implications.

~~SECRET~~

~~RESTRICTED DATA~~

~~NO FOREIGN DISSEM~~

Carried out against the backdrop of a vigorous congressional inquiry and under a tremendous wave of public pressure, the reorientation plans advanced fairly swiftly, if sometimes confusedly. Initially, defense leaders took only partial measures to buoy up the existing program, while a multitude of agencies--the JCS, the AFPC, and NSC, and others--deliberated over the advisability and feasibility of new and alternate proposals. Several months would pass before the Defense Department completed the first round of program redirection, and the Administration would take another several months to give this its "blessing."

James D. [unclear] 1957
in the wake of Sputnik
General White, sensing that public interest provided an environment more favorable to the attainment of an earlier and perhaps larger ballistic missile operational capability, called on 8 October for recommendations to improve the Air Force program. Obviously anticipating the request, AFBMD early the next morning supplied the Air Staff with a preliminary but rather complete set of proposals. The information provided the base from which Air Staff planning could start.²

After reviewing these first hasty plans, White on 16 October directed the preparation of a complete package, to be ready by 28 October. It was to indicate all possible measures to speed up and increase the operational capability. White wanted imaginative

~~RESTRICTED DATA~~

ideas and several possible alternative courses of action. For this planning exercise, the matter of money was of no importance although White wanted estimates of costs for the various proposals. AFBMD on 25 October supplied a 30-page study that became the nucleus of plans incorporated into an overall national defense package. Starting in mid-November the Air Force proposals wended their way through JCS, AFPC, the Bureau of the Budget (BOB), and the NSC and on to Congress for necessary fund appropriation legislation.³

Meanwhile the Air Force and the Department of Defense took those steps possible to accelerate the program under existing authorization and appropriations. Initially they concentrated on the IRBM. Thor and Jupiter were the most advanced of the ballistic missiles, but there still remained the knotty problem of selecting one or the other for production and operational duty. Too, On 10 October 1957, the NSC and the President, in view of the political and psychological implications of an early operational capability, called for the rapid deployment of IRBM's possessing only "reasonable accuracy" and slower reaction characteristics, a relaxation from earlier requirements.⁴

McElroy on 31 October directed Douglas to review the current Thor program and assure him that it was properly aligned to meet the President's objectives. In addition, McElroy withdrew

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

Wilson's onerous directive of mid-August downgrading Thor to the R&D level, but he kept the overtime and production restrictions in effect.⁵

Douglas was in no position to assure McElroy that the Thor program was in line with the President's directive. Since 13 August, Thor had been hopelessly mired in a morass of restrictions to the point where no approved production or operational plans existed. McElroy's 31 October directive had eased only slightly these difficulties.

McElroy issued a "similar" directive on Jupiter to the Army, which scarcely left Air Force officials in a happy frame of mind. Jupiter had possessed the status of a "weapon" development only. Now, for the first time, the Army was authorized to develop Jupiter as a complete weapon system capable of being produced and deployed. McElroy placed no restriction on the procurement of long-lead items, on overtime, or on production tooling.

Schriever claimed that the consequences of McElroy's two directives were "to tie the hands of the Air Force, to delay the achievement of an operational IRBM capability and to permit the JUPITER program to close the gap in the vital production and operational areas in which the THOR program is now clearly ahead of the JUPITER." The Assistant Chief of Staff for Guided Missiles,

~~SECRET~~

~~RESTRICTED DATA~~

~~SECRET~~

79

Brig. Gen. Charles M. McCorkle, held similar views. He noted that the Thor program had from the beginning been a complete "weapon system" development aimed at putting squadrons in the field.

Accordingly, activity in the production, training, and operational areas had gone on concurrently with the technical development work. McCorkle thought the two directives penalized the Air Force in areas where it was clearly ahead while accelerating and expanding the less advanced Jupiter program. DOD was, in his opinion, playing off Thor and Jupiter, one against the other, for a variety of reasons. It was easier to procrastinate than to make a decision. DOD wanted to treat both services fairly--and hurt neither. Lastly, there were extremely strong political involvements in a decision that eliminated either missile.⁶

Douglas frankly informed McElroy on 8 November that the Thor program was not properly aligned to meet the stated priority objectives. He sought permission to reinstate the procurement of ground support equipment (items of a long-lead nature) and to lift the overtime restrictions. The Secretary of the Air Force also reported that he would submit proposals in the near future for a larger and earlier IRBM operational capability. McElroy removed the overtime restriction on 13 November but kept the other Thor restrictions in effect.⁷

As promised by Douglas, the Air Force submitted its expanded

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

Thor capability plan to DOD on 14 November 1957. The Air Force stated a requirement for 16 Thor squadrons. With proper financial support and production authority, the Air Force could advance the operational date of the first squadron from July 1960 to August 1959 and complete a four-squadron force by May 1960 instead of January 1962. Another 12 squadrons could be added by June 1962. The Air Force premised the plan on the attainment of a production rate of eight missiles per month by July 1959 and of ten per month after June 1961.⁸

Even as DOD received the new proposal, the Air Force was in the midst of superseding it with another based on the latest AFBMD-contractor studies. AFBMD claimed that existent Thor production facilities were sufficient to permit a quick buildup to 20 missiles a month. At this rate, it appeared feasible to have one squadron operationally ready by 1 July 1958 and four by January 1959.⁹

A second proposal, submitted by Douglas to DOD on 18 November 1957, differed in several respects from AFBMD's latest estimates. Provided with an immediate go-ahead and an eight-per-month production authorization, the Air Force could have the first Thor squadron operational by June 1958, the fourth by June 1959, and an additional squadron every third month. The first two

RESTRICTED DATA

squadrons would contain military personnel augmented by contractor technicians.¹⁰

Although the Air Force obtained no immediate approval for either of its Thor proposals, reception was sufficiently warm to create an aura of optimism. The Air Staff on 15 November notified its field agencies to proceed immediately with plans to establish a six-per-month production capability but keep actual production to two missiles each month in line with the existing restriction. A week later, after AFBMD had furnished the information on a 20-per-month capability, LeMay authorized the division to push its planning up to the proposed figure.¹¹

In the hectic days of deliberation that followed, it soon became apparent that the DOD intended to put both the Thor and Jupiter into production, and on 25 November 1957 McElroy definitely committed himself to this step. Presidential approval came on 26 November, and the next day, before the preparedness subcommittee of the Senate Committee on Armed Services, McElroy publicly announced the Administration's decision.¹²

At the same time, having studied more than a dozen combination Thor-Jupiter operational plans drawn up between 25 and 27 November by the Air Force, William M. Holaday, Department of Defense Director of Guided Missiles, directed the Army and Air Force to proceed with the planning for the production and deployment

~~RESTRICTED DATA~~

~~NO RELEASE AFTER 1954~~

of four Thor and four Jupiter squadrons under Air Force operational command. The schedule called for an operational Thor squadron by 31 December 1958 (with a limited or partial capability six months earlier), the second by July 1959, the third by October 1959, and the last by March 1960. Jupiter had an identical schedule. Authorized production rates were six per month for Thor and five for Jupiter.¹³

The DOD decision was most unpopular with the Air Force.

The Air Staff immediately drew up protests, citing the inherent waste of time, money, and effort in the dual IRBM program. White on 3 December asked Douglas to press for a reversal of the decision, the termination of the Jupiter program, and the establishment of an operational force planned on valid military requirements. The protest was futile in the face of the immense political considerations, and on 20 December 1957 McElroy reaffirmed the decision to proceed with the production and deployment of four Thor and four Jupiter squadrons. Douglas instructed the Air Staff to participate in the Jupiter buildup in a spirit of cooperation and willingness.¹⁴

The Air Force was also disappointed in the authorized size of the force. Military requirements and production capabilities had pointed to the desirability, and feasibility, of establishing a 16-squadron force at an early date. DOD had allowed only eight squadrons, and the outlook was not bright for additional units because top departmental

~~SECRET~~~~RESTRICTED DATA~~~~NO FORN DISSEM~~

~~SECRET~~

83

officials had indicated little enthusiasm for the liquid-propellant IRBM's and considered them only interim weapons.¹⁵ The Air Force nevertheless continued its efforts to obtain additional squadrons.

The greatly accelerated Thor plans raised once again the highly critical question of bases in the United Kingdom. The Air Force and its British counterpart--the Royal Air Force (RAF)--during June 1957 worked out technical arrangements on a service-to-service basis, but further action was largely stymied by the failure of the two nations to come to full agreement at the governmental level. As a result, liaison between the two air forces had gradually tapered off following some joint service studies completed shortly after the June negotiations.

Sputnik and the resurgent Thor program provided the impetus for reenergizing American-British negotiations. By 21 December 1957, Quarles could inform Douglas that the governmental agreement was about ready for signature, and he authorized the Air Force to resume discussions with the RAF on the technical agreement.

Negotiations got under way in January 1958 and covered such topics as the manning of squadrons, selection of bases, dispersion of launching sites, training of personnel, construction, logistic and maintenance considerations, and a host of other operational problems.

Air Force and RAF representatives prepared a provisional

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT~~

agreement on 24 January. Before their respective services could confirm the document, internal political factors within the United Kingdom intervened. As a result, the RAF had to alter its position on a number of the provisions. It was not until 26 June 1958 that the principals signed the final agreement, bringing it into force.¹⁶

In contrast to the hurried measures taken with Thor, post-Sputnik planning activity on Atlas and Titan proceeded more slowly and in a more orderly fashion. The pressures were not quite so great, since the operational dates were farther into the future. Too, there was an approved Atlas operational plan in being; such was not the case with Thor. Attention directed to the two intercontinental ballistic missiles was nevertheless extensive, but it was several months before the Defense Department approved acceleration and augmentation plans. Further, it was more than another month before the Administration added its approval.

reversion of Sputnik 22 Nov 1957
Initial action in the ICBM area started on 8 October 1957, when Holaday advised Douglas that the DOD would entertain a request to lift overtime restrictions, should the Air Force deem it necessary. The actual removal of the restriction occurred on 22 November. About the same time, the DOD authorized the construction of a Titan test launching facility previously deleted from the program as an economy measure.¹⁷

~~SECRET~~~~RESTRICTED DATA~~~~(Atomic Energy Act 1954)~~

~~SECRET~~

Meanwhile, the Air Force readied expansion plans for the ICBM's. As noted earlier, General White on 8 October had requested this action, and AFBMD had responded the next day with some preliminary data. The division provided additional material on 25 October, in the form of a 30-page program study. This became the basis upon which the Air Staff prepared its recommendations. These went to DOD on 14 November 1957.¹⁸

The AFBMD had reported that it could make only minor schedule improvements in the initial phases of an ICBM operational capability. In the case of Atlas, construction of base facilities, production of ground support equipment, and training of personnel constituted the limiting factors and forestalled any substantial advancement in the operational date of the first squadron. Operational schedules for subsequent units, however, could be advanced, and some of the squadrons could even be deployed to hardened facilities without undue delay. Because the Air Force planned to use hardened facilities from the first with Titan, the nonavailability of design criteria for the construction of crew-training and operational facilities was the major obstacle to appreciably advancing Titan operational dates.¹⁹

Nov-Dec 1957
The plan which the Air Force submitted to DOD on 14 November proposed the establishment of nine Atlas squadrons.* Based on

* This was actually a real increase of only four squadrons since the Air Force intended to have a composite (training and operational) squadron at Cooke AFB, two-thirds of which was for training purposes. The training element would possess an emergency capability for "anger" launchings.

~~SECRET~~
~~RESTRICTED DATA~~

~~NOV-DEC 1957~~

a production rate of six missiles per month (as against the currently authorized four), the first Atlas complex would be operational by July 1959--no advance over the existing schedule--and the fourth squadron operational by June 1961--only a three-month advance over current plans. The remaining squadrons, all of them in hardened facilities, would come along between March 1962 and March 1963.²⁰

Under the same plan, the Air Force asked for eight Titan squadrons in lieu of the four tentatively planned. With production of six Titans a month, the Air Force estimated that the first squadron could become operational by May 1961 rather than on the tentatively scheduled November 1961. However, favored with the increased production rate, the operational date of the fourth squadron would advance nine months, from October to January 1962. The other four squadrons would be in place between April 1962 and January 1963.²¹

After considering the Air Force reprogramming proposal for about a month, the DOD on 12 December 1957 approved the Atlas portion for planning purposes. Holaday made no mention of the Titan, thereby keeping this part of the ICBM effort in a status quo condition--at the four-squadron level.²²

The Air Force was not particularly pleased with the 13-squadron ICBM force, claiming that a valid military requirement existed for 60 squadrons by fiscal year 1964. When AFBMD, late in December 1957,

~~SECRET~~

87

provided additional studies for several other alternate courses of action leading to a larger force in roughly the same period of time, the Air Staff showed considerable interest. Departmental and Air Staff officials on 7 January 1958 thrashed out these possibilities. An especially appealing proposal would result in 21 squadrons--13 Atlas and 8 Titan--in the period for which only 9 Atlas and 4 Titan squadrons were currently scheduled. Douglas directed his missile aides to carry out the necessary documentation, preparatory to the submission of the proposal through the usual AFBMC and OSD-BMC channels.²³

Holaday on 30 January 1958 presented the third annual ballistic missile briefing to NSC and the President. He reported the results of the extensive program reviews since early October. The planned IRBM IOC forces now consisted of 4 Thor and 4 Jupiter squadrons, to be available considerably in advance of the previous schedule. The planned ICBM IOC force now included five Atlas squadrons* with accelerated operational dates and four Titan squadrons still tied to the old schedule. The NSC and the President approved the planned program without change.²⁴

The reprogramming activity of the months between the

* Holaday explained that DOD had programmed four "hard" Atlas squadrons in addition to the IOC force but seemed to indicate that this was still not completely firm, being for planning purposes only.

~~SECRET~~

~~RESTRICTED DATA~~

~~CONFIDENTIAL~~

launching of Sputnik I and the end of 1957 pointed up the weakness of the "off and on," "hot and cold" policies employed by the Administration in dealing with the ballistic missile IOC effort. At no time since 1954 had the crucial aspects of the military requirements disappeared. And it was possible to recoup "lost time" only at great expense and effort, and at added risk. In the long run, continuance of the original IOC program probably would have been more productive and less expensive.

AFBMD in a March 1958 resumé on the ballistic missile schedules explained that many factors had played a role in the numerous fluctuations since the program began. A major factor was the frequent changes in program directives--both decelerative and accelerative in nature. Said AFBMD:²⁵

Included in these changed directives were "stretch-out" of the program; acceleration of the "stretch-out"; limitations in production rates; budget restrictions; overtime restrictions; lifting of restrictions; changes in operational force structures; and changes in operational concepts of "soft-base" versus "hard-base." The net result of these changed directives upon the program was the difficulty in making long-lead procurement and planning, generally affecting the ability to build up a sizable operational force as early as originally possible. Inevitably, the time consumed by the Air Force and contractors in frequently redeveloping the program schedules diverted from the primary effort.

SECRET

DECLASSIFIED

ATOMIC ENERGY ACT OF 1954

~~SECRET~~

Chapter IX

THE DEMISE OF THE IOC PROGRAM

The world situation in 1954-55 required the attainment of an early ballistic missile operational capability. The Air Force responded with the IOC concept--basically a scheme in which AFBMD, the development agency, received responsibilities and authority normally assigned to ATC, SAC, and, to a lesser degree, AMC. No organization within the Air Force at the time possessed the requisite knowledge and experience within the ballistic area; AFBMD represented the best choice under the circumstances. Whatever reservoir of ballistic missile knowledge existed was concentrated there. SAC, long a vigorous proponent of its prerogatives, in this instance had no voice in the assignment of responsibilities. Significantly, however, neither did SAC raise an objection to the arrangement. All of the commands, however, established a close liaison with AFBMD and performed important functions in the IOC program.¹

The Air Force Ballistic Missile Division had thus been conducting a highly compressed, three-pronged program--development, training, and operational--in the period from 1955 to the launching of Sputnik I. Progress had been noteworthy in all three areas, despite the numerous fluctuations and vicissitudes in the missile program

~~SECRET~~

90

generally and in the IOC portion particularly. By the fall of 1957, AFBMD had managed to meet pretty much on schedule the projected technical milestones, and the beginnings of an operational capability was well along the way. The operational goal seemed not too far in the distance.

A major difficulty recognized at an early date was the long lead time (a period up to three years) involved in the selections, design, construction, and equipping of training and operational bases. Within weeks after its appointment in December 1955 as the responsible IOC agency, AFBMD (then WDD) established a site screening group. By the end of June 1956, a special site selection board had recommended Camp Cooke, Calif., an inactive Army station along the Pacific, as the most desirable place for the first ballistic training-operational base. Secretary Quarles approved the selection on 1 September, but it was not until mid-November and the settlement of several inter-service questions that Wilson agreed to transfer the major portion of Camp Cooke to the Air Force. Initially redesignated Cooke AFB, and later Vandenberg AFB, the base was to serve both as a training station for the Thor, Atlas, and Titan missiles and as an emergency operational facility for Atlas. Construction of Atlas facilities at Cooke began in May 1957. Work on Thor launching facilities began a month later.²

Even before deliberations over the selection of Cooke were

~~SECRET~~
~~RESTRICTED DATA~~
~~TOP SECRET - FROTH~~

complete, AFBMD formed another panel to recommend suitable sites for the Atlas and Titan IOC bases. By August 1957 the Air Force had selected Warren AFB, Wyo., as the first Atlas operational base and had tentatively tagged Lowry AFB, Colo., for Titan operational use. By October, siting work for two Atlas launching complexes at Warren was complete. In the same month, the Air Force let a contract for the design and construction of a Titan launching and support facility at Cooke, hardened to withstand nuclear explosive overpressures of up to 100 pounds per square inch.³

The establishment of IOC organizational units had also progressed in orderly fashion. As early as June 1956, ARDC had prepared plans for organizing and manning the IOC units. The command presented these plans to the Air Force Council on 18 June and won general acceptance of them. ARDC made its first request for an IOC personnel allotment on 21 November 1956, shortly after AFBMC had finally approved the IOC force and schedule plans. The command wanted the first batch of men to support the rapidly expanding activity at Cooke as well as to begin training indoctrination. The Air Staff on ¹⁹⁵⁶30 November approved ARDC's request for 26 officers and 133 airmen.⁴

The first move to establish specific IOC units came four days after ARDC gave an up-to-date personnel briefing to the Air Staff, on 11 January 1957. ARDC asked the Chief of Staff to activate an air

~~SECRET~~~~RESTRICTED DATA~~~~AFBMD-1000-1001-1001-1001~~

~~SECRET~~

92

division for the purpose of supervising the training and operational phases of the IOC program and an air base group to operate Cooke. When the Air Staff requested further justification for such a move at this time, ARDC responded with a study that spelled out in detail the requirement for the two units. The command also listed a need to establish a wing by 15 June 1957 to supervise IOC training and a training squadron by December to undertake the specific training of Thor personnel.⁵

The Air Staff concurred in ARDC's study and, on 13 March 1957, authorized the activation of the 1st Missile Division and the 392d Air Base Group, both effective 1 April 1957. Headquarters USAF later authorized the training wing and the Thor training squadron requested by ARDC. AFBMD established the 704th Strategic Missile Wing in July and the 392d Missile Training Squadron (Thor) in September 1957. In addition, during July, AFBMD activated the 6952d Support Squadron (Missile Technical). This squadron, slated for duty with SAC headquarters when fully trained, would compute target trajectories and provide operational units with proper guidance settings for each combat missile.⁶

Thus, by the fall of 1957, AFBMD, in cooperation with the interested commands, had the nucleus of an IOC force in being, although basically all units were support rather than operational in

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

nature. With the reenergizing of the ballistic missile program shortly after Sputnik I, the Air Force quickly planned the establishment of the 672d Strategic Missile Squadron (Thor) and the 706th Strategic Missile Wing (Atlas). Both were activated on 1 January 1958, the 672d as the first operational Thor unit and the 706th as the supervisor of Atlas operational activity at Warren.⁷

As he had done with the overall ballistic missile program following the launching of the Russian satellites, General White called for a careful analysis of the current IOC management structure and for any recommended changes to attain an earlier operational capability. On 27 November 1957 the major field commanders concerned with the creation of the IOC force--Power of SAC, Schriever of AFBMD, Gen. Edwin W. Rawlings of AMC, Lt. Gen. Samuel E. Anderson of ARDC, and Brig. Gen. Ben I. Funk of the Ballistic Missile Office*--met at Wright-Patterson AFB. They agreed that the time had come to abolish the peculiar arrangement that was the IOC concept and revert to more normal procedures of operation. The senior officers suggested to White the transfer to SAC of all IOC training and operational responsibilities, units, and bases, as well as AFBMD's Office of the Deputy Commander for Plans and Operations.⁸

* The Ballistic Missile Office was the special AMC unit established at Inglewood to assist AFBMD in procurement and production matters.

~~SECRET~~

96

in which SAC was at its best. SAC also possessed a global command structure with worldwide communications and control facilities. These provided an excellent framework for the early integration of ballistic missile units and bases into SAC's day-to-day operations and war plans.

? There was also the distinct likelihood of handing over to the Strategic Air Command operational units not SAC-oriented. There were peculiarities in SAC's system of operation which necessarily had to be incorporated into the ballistic missile units if they were to operate as an integral part of SAC's striking force.

The transfer also accomplished one other important essential, from SAC's point of view. For the first time, the command possessed full responsibility for a portion of the IOC program and had a channel of communication to the AFBMC and OSD-BMC. In the past, SAC had worked closely with AFBMD, made pertinent recommendations, and stated its views; the latter, however, had the final responsibility. SAC could now deal as a full participant with the two all-important decision-making committees.¹²

In the final analysis, the transfer of some IOC responsibilities was inevitable. Holaday in his 30 January 1958 presentation to NSC and the President was probably correct in stating that "this is the step that had been planned from the beginning and comes at a time when maximum benefit can be realized by the operational command."

~~SECRET~~

~~RESTRICTED DATA~~

~~NO FORN DISSEM~~

~~SECRET~~

97

He thought, too, that "the added strength of the Strategic Air Command to the program will accelerate planning, training, and strategic-operational capabilities." Power stated it more succinctly when he noted that the changes were "in line with General White's desire to get SAC into the picture as soon as possible without 'rocking the boat' and upsetting the overall program."¹³

In a practical sense, AFBMD's statement of a later date summed up the results of the transfer: "This realignment eliminated the IOC program."¹⁴ The novel IOC managerial concept was a thing of the past. It had been an interim scheme, one of many devised and employed by the Air Force in the ballistic missile area at a time when a void existed. It had allowed one agency to plan and conduct work concurrently in three major areas while others normally responsible for the job prepared to undertake their proper role.

Although the Air Force had altered the unique management structure and returned functional responsibilities to more normal channels, the original objective of the IOC program remained unchanged. Advancement toward the goal of deployed missiles ready for "anger" launchings at the earliest practicable date continued as rapidly as technology and the Administration's fiscal policies allowed. In September 1959, only three months beyond the planned date, the first Atlas

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

98

complex was combat ready at Vandenberg. Thor had not fared so well and appeared to be lagging far behind schedule, although such was not the case. By December 1958, under emergency conditions the Air Force and RAF could have launched at least six Thor's in "anger." International and internal British political motives had, however, kept the RAF from declaring the missile operational.

~~SECRET~~

~~RESTRICTED DATA~~

~~NO DISSEMINATION TO THE PUBLIC~~

~~SECRET~~

NOTES

CHAPTER I

1. Ltr, Col W. F. McKee, Actg AC/AS, OC&R to Pres, AAF Bd, subj: Military Characteristics for Guided Missiles, 10 Feb 45; memo, Brig Gen W. F. McKee, Actg AC/AS, OC&R to AC/AS, M&S, subj: Military Characteristics for Controlled Missiles, 5 Apr 45; ltr (with incls), Maj Gen E. M. Powers, AC/AS-4 to CG, ATSC, subj: Goals for Long Term Guided Missiles Program, 10 Sep 45.
2. Ltr, Maj Gen H. J. Knerr, CG, ATSC to CG, AAF, subj: AAF Long Term Guided Missiles Program, 26 Nov 45; ltr, Col G. E. Price, Ch, Acft Projs Sec, Engr Div, ATSC to CG, AAF, subj: Progress Report in Current Guided Missiles Program, 5 Dec 45 (and similar ltrs dtd 12 Feb 46, 11 Mar 46, and 10 May 46); ltr, Col G. F. Smith, Ch, Svs Engr Subdiv, Engr Div, AMC to CG, AAF, subj: AMC Guided Missile Program, 29 Mar 46.
3. Ltr Contr W33-038-AC-14168, 2 Apr 46; ltr, Maj Gen B. W. Chidlaw, DCG, Engr, AMC to CG, AAF, subj: AAF Guided Missile Program, 6 May 47.
4. Ltr, Lt Gen N. F. Twining, CG, AMC to CG, AAF, subj: AAF Guided Missiles Research and Development Program--Where We Stand, 25 Mar 47; ltr, Chidlaw to CG, AAF, 6 May 47; R&R-2, Col M. S. Roth, Ch, GM Sec, Engr Div to DCG, Engr, AMC, subj: Current and Revised AAF Guided Missiles Program, 1 Aug 47.
5. Ltr, Lt Gen H. A. Craig, DCS/M to CG, AMC, subj: Procurement of Guided Missiles from Project 180 Supplemental FY 1948 Funds, 20 Sep 48; Minutes of 15th GMC Mtg, 10 Feb 49; R&R, Col J. H. Carter, Ch, GM Sec, Engr Div to Electronics Subdiv, AMC, subj: MX-774 missiles to be used in Upper Air Research Program, 28 Feb 49; R&R, Col J. H. Carter to Power Plant Lab, AMC, subj: Discontinuance of Project MX-774, 7 Apr 49; Minutes of 16th GMC Mtg, 14 Apr 49.
6. Ltr, Col H. J. Sands, Ch, GM Sec, Engr Div, AMC to NAA, Inc, subj: Ramjet vs Rockets for Long Range Guided Missiles, 14 Oct 49; memo, Col H. J. Sands, Asst for GM, Engr Div to Ch, Engr Div, AMC, no subj, 17 Feb 50; RAND Reports R-174 through R-182, Long-Range Surface-to-Surface Rocket and Ramjet Missiles

99
~~SECRET~~
~~RESTRICTED DATA~~

(each report covering a specific portion of the subject), 1 May 50; Minutes of AMC Conference, 17 Oct 50, 27 Dec 50, and 3 Jan 51; ltr, DCS/D to CG, AMC, subj: Long Range Rocket, 16 Jan 51; AMC Tech Instruction (TI) 2003-116, subj: Long Range Rocket, 31 Jan 51.

7. Ltr, DCS/D to CG, AMC, 16 Jan 51; AMC TI 2003-116, 31 Jan 51.
8. USAF Annual Guided Missiles Report, 1 Oct 53; AC/S (GM) Chronology, Significant Historical Data for Atlas, Dec 57.

CHAPTER II

1. AFPC Advice of Action, subj: Guided Missiles, 16 Jun 53; Report of the Special Study Group on Guided Missiles (hereinafter cited as Gardner Rpt), 25 Jan 54; Trevor Gardner, "How We Fell Behind in Guided Missiles," The Air Power Historian, Jan 58.
2. See note above.
3. Gardner Rpt; Gardner, "How We Fell Behind."
4. Contr AF 18(600)-1002, 15 Oct 53; ltr, T. Gardner, Sp Asst to SAF for R&D to Dr. J. von Neumann, no subj, 31 Oct 53. Similar letters from Gardner went to the other men who became the Strategic Missiles Evaluation Committee.
5. Ltr, Gardner to von Neumann, 31 Oct 53; Recommendations of the Strategic Missiles Evaluation Committee (hereinafter cited as the Teapot Rpt), 10 Feb 54; Gardner, "How We Fell Behind."
6. AFSWC Tech Note SWR 53-12, Preliminary Study of Nuclear Warheads for High Performance Missiles, 15 Sep 53; Teapot Rpt; RAND Study TS-937, A Revised Development Program for Ballistic Missiles of Intercontinental Range, 8 Feb 54; Gardner, "How We Fell Behind."
7. See note above.
8. Memo, T. Gardner to Gen N. F. Twining, C/S, no subj, 27 Jan 54.
9. Memo, T. Gardner to Asst SOD/R&D, no subj, 16 Feb 54; memo, D. A. Quarles, Asst-SOD/R&D to Sp Asst to SAF/R&D, no subj, 19 Feb 54; memo, T. Gardner to H. A. Talbott, SAF, and Gen. N. F. Twining, C/S, subj: IBMS Acceleration Plan, 11 Mar 54.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT~~

10. Memo, Gardner to Talbott and Twining, 11 Mar 54.
11. Memo, H. A. Talbott, SAF to T. Gardner, subj: IBMS Acceleration Plan, 19 Mar 54; memo, H. A. Talbott, SAF to Gen. N. F. Twining, C/S, subj: Acceleration of the IBMS Program, 19 Mar 54.
12. Memo, Lt Col W. C. Cooper, Secy, Acft & Weap Bd to Secy, AFC, subj: Review of USAF Strategic Missile Program, 9 Mar 54.
13. Memo, Gen T. D. White, Chr, AFC to C/S, subj: USAF Strategic Missile Program, about 16 Mar 54, with Twining's note of approval appended as of 23 Mar 54.
14. Memo, F. A. Darwin, Exec Secy, CCGM to Asst SOD/R&D, subj: Action by the CCGM (R&D) Pursuant to the Report of the Strategic Missiles Evaluation Committee, 23 Mar 54; memo, R. M. Keyes, Dep SOD to SAF, subj: Strategic Ballistic Missile, 9 Apr 54.
15. USAF HOI 21-2, 8 Apr 54; memo, Gen T. D. White, VC/S to Air Staff, subj: Project ATLAS, 14 May 54; memo, Lt Gen D. L. Putt, DCS/D to DCS/D directorates, subj: Project ATLAS, 28 May 54; ARDC Mil Ops Order 1-54, 29 Jul 54.
16. Ltr, Lt Gen D. L. Putt, DCS/D to Comdr, ARDC, subj: Project ATLAS, 21 Jun 54; ARDC GO 42, 15 Jul 54; ARDC Mil Ops Order 1-54, 29 Jul 54; Chronology of Air Force Ballistic Missile Project, Western Development Division, 1 January 1950-31 December 1955 (App III of WDD Hist Rpt, 1 Jul-31 Dec 55).
17. Presn by T. Gardner to SOD, 10 Dec 54; memo, Col R. E. Soper, Sp Asst, AC/S(GM) to Maj R. G. Illing, WDD Liaison Office, subj: ATLAS Presentation to OSD, 10 December 1954, dtd 14 Dec 54.

CHAPTER III

1. Memo, T. Gardner, Asst SAF/R&D to H. A. Talbott, SAF, no subj, 28 Jun 55, with attached informal memo dtd 29 Jun 55.
2. Ltr, C. P. Anderson, Chr, Jt Cong Cmte on AE, and H. M. Jackson, Chr, Subcmte on Mil Applications to Pres D. D. Eisenhower, no subj, 30 Jun 55.

~~SECRET~~
~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

3. Memo, Col A. J. Goodpaster, White House Staff Secy to SOD, no subj, 1 Jul 55; TWX, R. E. Hoover, Dep/Rqmt, OSAF to T. Gardner, Asst SAF/R&D, no subj, 6 Jul 55.
4. Report to the President by the Technological Capabilities Panel (hereinafter cited as Killian Rpt), 14 Feb 55; memo, R. B. *Robertson* Anderson, Actg SOD to Secys, Mil Depts and JCS, subj: Technological Capabilities Panel Report, 1 Mar 55; NSC Action 1355, 17 Mar 55; memo, C. E. Wilson, SOD to Exec Secy, NSC, subj: Technological Capabilities Panel Report, 3 Jun 55; draft memo, J. S. Lay, Exec Secy, NSC to NSC, subj: Recommendations of the Report to the President by the Technological Capabilities Panel of the Science Advisory Committee, ODM, 26 Jul 55.
5. Killian Rpt.
6. Draft memo, Lay to NSC, 26 Jul 55; memo, T. Gardner, Asst SAF/R&D to SAF, no subj, 27 Jul 55; draft memo, S. E. Gleason, Actg Exec Secy, NSC to NSC, subj: Intercontinental Ballistic Missiles Program, 30 Aug 55.
7. Draft memo, Gleason to NSC, 30 Aug 55.
8. JSPC 902/575, 31 Aug 55, which after revision became JCS 1899/230, 1 Sep 55; memo, JCS to SOD, subj: Intercontinental Ballistic Missiles Program, 2 Sep 55; NSC Action 1433, 8 Sep 55; ltr, Pres D. D. Eisenhower to Sen C. P. Anderson, Chr, Jt Cong Cmte on AE, no subj, 13 Sep 55; memo, R. B. Robertson, Dep SOD to Secys, Mil Depts and JCS, subj: Intercontinental Ballistic Missile Program, 17 Sep 55.
9. Memo, Robertson to Secys, Mil Depts and JCS, 17 Sep 55.
10. Memo, T. Gardner, Asst SAF/R&D to H. Gillette, Dep/Bud & Prog Mgmt, OSAF, no subj, 13 Sep 55.
11. Report of the ICBM Administrative Procedures Evaluation Group, 29 Sep 55.
12. Memo, H. Gillette, Dep/Bud & Prog Mgmt to Asst SAF/R&D, subj: Revisions of the Report of the ICBM Administrative Procedures Evaluation Group, 14 Oct 55; Air Force Plan (Revised) for Simplifying Administrative Procedures for the ICBM (hereinafter cited as Gillette Rpt), 21 Oct 55; memo, D. A. Quarles, SAF to Dep SOD, subj: ICBM Procedures, 25 Oct 55; memo, C. E. Wilson, SOD to Asst SOD's, Secys, Mil Depts and JCS, subj:

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT-1954~~

Establishment of the OSD Ballistic Missiles Committee (OSD-BMC), 8 Nov 55; memo, C. E. Wilson, SOD, to Secys, Mil Depts, JCS, and Asst SOD/R&D, subj: Intercontinental Ballistic Missile (ICBM) and Intermediate Range Ballistic Missile (IRBM) Programs, 8 Nov 55.

13. Memo, D. A. Quarles, SAF to Asst SAF/R&D and C/S, subj: Establishment of the AF Ballistic Missiles Committee, 14 Nov 55; memo, Quarles to C/S, subj: Implementation of Approved Management Procedures and Concepts Related to the Management of the ICBM and IRBM Programs, 14 Nov 55; memo, Gen T. D. White, VC/S to AC/S (GM), subj: Administration of the ICBM and IRBM Programs, 18 Nov 55; memo, White to Air Staff, subj: Administration of the ICBM and IRBM Programs, 18 Nov 55; ltr, White to CinC, SAC, subj: Priority of the ICBM and IRBM Programs, 18 Nov 55 (identical ltrs to TAC, ADC, ARDC, APGC, AMC, ATC, and AU).
14. Killian Rpt.
15. Memo, Wilson to NSC, 3 Jun 55; NSC Action 1430C, 4 Aug 55; memo, R. B. Robertson, Dep SOD to Secys, Mil Depts and Asst SOD/R&D, subj: 1500-Mile Ballistic Missile, 6 Sep 55.
16. Memo, Robertson to Mil Depts and JCS, 6 Sep 55; Army, Navy, and USAF presentation on IRBM plans to R&D Policy Council, 26 Sep 55; memo, Jt Secys to Ops Depts, JCS, subj: Briefings on Medium- and Long-Range Guided Missiles, 10 Oct 55; memo, J. B. Macauley, Dep Asst SOD/R&D to Mil Depts and JCS, subj: Intercontinental Ballistic Missile (ICBM) and Intermediate Range Ballistic Missile (IRBM) Programs, 12 Oct 55; memo, T. Gardner, Asst SAF/R&D to Asst SOD/R&D, subj: ICBM and IRBM Programs, 14 Oct 55; memo, A. G. Waggoner, Tech Advisory Panel on Aero to S/A and SAF, subj: ICBM and IRBM Programs, 18 Oct 55; memo, C. E. Wilson, SOD to JCS, subj: Definition of Mission Requirements of the Military Services for the IRBM, 20 Oct 55; JCS 1620/113; JCS 1620/114; JCS 1620/115; memo, JCS to SOD, subj: Definition of Mission Requirements of the Military Services for the IRBM, 2 Nov 55.
17. Memo, Wilson to Mil Depts and JCS, 8 Nov 55.
18. NSC Action 1484, 1 Dec 55; memo, R. B. Robertson, Dep SOD to Mil Depts, JCS, and Asst SOD's, subj: Intercontinental Ballistic Missile (ICBM) and Intermediate Range Ballistic Missile (IRBM) Programs, 23 Dec 55.

SECRET

~~SECRET~~

104

19. Memo for Record by Col R. E. Soper, Sp Asst to AC/S (GM), subj: Evaluation of Certain Aspects of Current Strategic Missile Programs, 14 Nov 55; memo, Gen N. F. Twining, C/S to SAF, subj: Priority of ICBM and IRBM Programs, 6 Feb 56; informal memo, D. A. Quarles, SAF to SOD, no subj, 7 Feb 56.

CHAPTER IV

1. Gillette Rpt, as revised on 10 Nov 55.
2. Ibid.; Teapot Rpt; interview with Maj Gen C. M. McCorkle, AC/S (GM) by author, 19 Feb 59.
3. Gillette Rpt.
4. Ibid.
5. Ltr, Gen T. D. White, VC/S to Comdr, ARDC, subj: Initial ICBM Operational Capability, 18 Nov 55.
6. Ltr, Gen T. D. White to CinC, SAC, subj: Priority of the ICBM and IRBM Programs, 18 Nov 55.
7. TWX PL 3671, SAC to C/S, 2 Feb 56; memo, Gen T. D. White, VC/S to Air Staff, subj: Operational Utilization of the 1500 Mile Ballistic Missile (IRBM), 20 Feb 56; TWX 56758, C/S to all major commands, 24 Feb 56.
8. Memo, Col R. E. Soper, Sp Asst, AC/S (GM) to Ch, Strat Msl Div, AC/S (GM), subj: Operational Concept--WS315A, 23 Feb 56.
9. TWX 56310, C/S to ARDC and SAC, 17 Feb 56; TWX RDGB-2-19-E, ARDC to C/S, 24 Feb 56; ASSS, Brig Gen R. E. Koon, Dep Dir/Ops to C/S, subj: Initial Operational Capability for the IRBM, 21 Mar 56.
10. Memo for Record by Lt Col L. C. Brooks, Bomb Br, Dir/Ops, DCS/O, subj: Staff Visit Report, 6 Mar 56; ASSS, Koon to C/S, 21 Mar 56; TWX TS 1922, C/S to ARDC and SAC, 22 Mar 56.
11. TWX RDGB-4-5-E, ARDC to C/S, 12 Apr 56; SAC/ARDC Joint Agreement for IRBM Initial Operational Capabilities, 7 May 56; ltr, Maj Gen J. E. Smart, Asst VC/S to Comdr, ARDC, subj: SAC/ARDC Joint Agreement for IRBM Initial Operational Capability Responsibilities, 25 Jul 56 (identical ltr to SAC).

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

CHAPTER V

1. Ltr, Lt Gen T. S. Power, Comdr, ARDC to Maj Gen B. A. Schriever, Comdr, WDD, subj: Authority for ICBM and IRBM Programs, 14 Dec 55; WDD Hist Rpt, 1 Jul-31 Dec 55, pp 3, 114.
2. ASSS, Col F. O. Easily, Dep Dir/Ops, DCS/O to VC/S, subj: Initial Operational Capability, ICBM and IRBM, 31 May 56; memo, Maj Gen S. R. Brentnall, AC/S (GM) to VC/S, subj: ICBM/IRBM Initial Operational Capability (IOC) Plans, 6 Jul 56; ltr, Gen T. D. White, VC/S to Comdr, ARDC, subj: Initial Operational Capability, SM-65, 28 Dec 55.
3. Ltr, White to Comdr, ARDC, 28 Dec 55; Draft Preliminary Operational Concept for SM-65 (Atlas), 18 Jan 56, revised 27 Feb 56.
4. Western Development Division (ARDC) Development Plan, 18 Nov 55; Minutes of 1st AFBMC Mtg, 23 Nov 55.
5. WDD (ARDC) Dev Plan, Vol II, 15 Mar 56; ltr, Maj Gen B. A. Schriever, Comdr, WDD to C/S, subj: Western Development Division (ARDC) Development Plan, 19 Mar 56; Memo for Record by Maj W. G. Wells, Dep Sp Asst, AC/S (GM), subj: Operational Planning for ICBM, 28 Mar 56; Minutes of 3d AFBMC Mtg, 29 Mar 56.
6. ASSS, Brig Gen R. E. Koon, Dep Dir/Ops to C/S, subj: Initial Operational Capability for the ICBM, 30 Apr 56; ltr, Gen T. D. White, VC/S to Comdr, ARDC, subj: Initial Operational Capability for the ICBM, 4 May 56.
7. TWX RDGB-5-7-E, ARDC to C/S, 9 May 56.
8. Ltr, Gen C. E. LeMay, CinC, SAC to C/S, subj: IRBM/ICBM Conference Between SAC and ARDC, 17 May 56.
9. ASSS, Col R. E. Soper, Sp Asst, AC/S (GM) to C/S, subj: ICBM Initial Operational Capability, 23 May 56; TWX 51340, VC/S to ARDC, WDD, and SAC, 23 May 56.
10. Ltr, Maj Gen B. A. Schriever, Comdr, WDD to C/S, subj: Transmittal of Revision to WDD (ARDC) Ballistic Missile Development Plan, 14 Jun 56; memo, Maj Gen S. R. Brentnall, AC/S (GM) to Air Staff, subj: Review of the

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY~~

- ICBM/IRBM Operational Program, 19 Jun 56; memo, Brentnall to VC/S, 6 Jul 56.
11. Minutes of 4th AFBMC Mtg, 3 Jul 56; notes by Col R. E. Soper, Sp Asst, AC/S (GM), 3 Jul 56; memo, Brentnall to VC/S, 6 Jul 56; memo, D. A. Quarles, SAF to J. H. Douglas, U/SAF, subj: ICBM Operational Sites, 24 Jul 56.
 12. Memo, Brentnall to VC/S, 6 Jul 56; memo, Maj Gen J. B. Smart, Asst VC/S to DCS/O, subj: ICBM Capability, 19 Jul 56; ASSS, Brig Gen C. M. McCorkle, Dep AC/S (GM) to C/S, subj: ICBM/IRBM Initial Operational Capability (IOC) Plans, 19 Aug 56; informal memo, Gen T. D. White, VC/S to AC/S (GM), 20 Aug 56.
 13. Staff Study by Col R. E. Soper, Sp Asst, AC/S (GM), subj: Annual Review of Ballistic Missile Program, 19 Sep 56; Minutes of 5th AFBMC Mtg, 27 Sep 56.
 14. See note above; memo, Gen T. D. White, Chr, AFC to C/S, subj: Annual Review of the Ballistic Missile Program, 26 Sep 56, with Twining's note of approval attached; notes on AFC mtg by Col R. E. Soper, 24 Sep 56.
 15. Minutes of 5th AFBMC Mtg, 27 Sep 56; notes on 5th AFBMC mtg by Col R. E. Soper, Secy, AFBMC, 27 Sep 56.
 16. Staff Study by Soper, 19 Sep 56; memo, Maj Gen J. B. Smart, Asst VC/S to AC/S (GM), subj: Ballistic Missile Program, 9 Nov 56; Memo for Record by Col R. E. Soper, subj: AFC Review of WS-107/315 Programs, 9 Nov 56; Minutes of 6th AFBMC Mtg, 10 Nov 56; TWX 48676, C/S to WDD, 16 Nov 56.
 17. Memo, R. E. Horner, Actg Asst SAF/R&D to OSD-BMC, subj: Air Force Ballistic Missile Program, 23 Nov 56; memo, Col. R. E. Soper, Secy, AFBMC to SAF and Air Staff, subj: OSD-BMC Review of the Air Force Revised Ballistic Missile Program, 6 Dec 56; memo, C. E. Wilson, SOD to Mil Depts and JCS, subj: Ballistic Missiles Program, about 11 Jan 57.
 18. Memo, D. A. Quarles, SAF to SOD, subj: Ballistic Missile Operational Capability, 12 Jan 57; memo, E. V. Murphree, Sp Asst to SOD/GM to SOD, no subj, 21 Mar 57; ltr, C. E. Wilson, SOD to Pres, no subj, 23 Mar 57.
 19. Memo, R. B. Robertson, Dep SOD to Mil Depts and JCS, subj: Ballistic Missiles Program, 5 Apr 57.

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

20. Ltr, Maj Gen J. B. Smart, Asst VC/S to Comdr, ARDC, subj: Initial Operational Capability, ICBM, 5 Mar 57.

CHAPTER VI

1. TWX 56310, 17 Feb 56; TWX TS 1922, 22 Mar 56.
2. SAC/ARDC Jt Agmt, 7 May 56.
3. Ltr, LeMay, CinC, SAC, to C/S, subj: IRBM/ICBM Conference Between SAC and ARDC, 17 May 56; TWX WDO-5-7-E, WDD to C/S, 24 May 56; TWX 40470, C/S to ARDC, 1 Jun 56.
4. Ltr, Schriever, Comdr, WDD to C/S, subj: Transmittal of Revision to WDD(ARDC) Dev Plan, 14 Jun 56; WDD Dev Plan, 15 Jun 56.
5. Memo, Brentnall to Air Staff, subj: Review of the ICBM/IRBM Operational Program, 19 Jun 56; Minutes of 4th AFBMC Mtg, 3 Jul 56; notes by Soper, 3 Jul 56; memo, Brentnall to VC/S, subj: ICBM/IRBM Initial Operational Capability Plans, 6 Jul 56.
6. Minutes of 4th AFBMC Mtg, 3 Jul 56; draft ASSS, AC/S(GM) to C/S, subj: ICBM/IRBM Initial Operational Capability (IOC) Plans, about 10 Jul 56.
7. WDD Dev Plan, Vol II, 1 Sep 56; memo, White to C/S, subj: Annual Review of the Ballistic Missile Program, 26 Sep 56; notes on AFC mtg by Soper, 24 Sep 56.
8. Minutes of 5th AFBMC Mtg, 27 Sep 56; notes on 5th AFBMC mtg by Soper, 27 Sep 56.
9. Memo, Col J. J. Huddleston, Dep AC/S (GM) to VC/S, subj: Presentation Schedule of Ballistic Missile Program, 29 Oct 56; Staff Study by Soper, subj: Annual Review of Ballistic Missile Program, 2 Nov 56; memo, Smart to AC/S (GM), subj: Ballistic Missile Program, 9 Nov 56; Minutes of 6th AFBMC Mtg, 10 Nov 56; TWX 48676, 16 Nov 56.
10. Memo, Horner to OSD-BMC, subj: Air Force Ballistic Missile Program, 23 Nov 56; memo, Soper to SAF and Air Staff, subj: OSD-BMC Review of the Air Force Revised Ballistic Missile Program, 6 Dec 56; memo, Wilson to Mil Depts and JCS, subj:

~~SECRET~~~~RESTRICTED DATA~~~~RESTRICTED DATA~~

Ballistic Missiles Program, about 11 Jan 57; memo, Quarles to SOD, subj: Ballistic Missile Operational Capability, 12 Jan 57; memo, Robertson to Mil Depts and JCS, subj: Ballistic Missiles Program, 5 Apr 57.

11. Ltr, Maj Gen J. B. Smart, Asst VC/S to Comdr, ARDC, subj: Initial Operational Capability, IRBM, 5 Mar 57.
12. Minutes of 6th AFBMC Mtg, 10 Nov 56.
13. Ltr (with atch), Maj Gen B. A. Schriever, Comdr, WDD to C/S, subj: IRBM Emergency Capability Plan, 24 Dec 56.
14. Ltr (1st Ind), Lt Gen T. S. Power, Comdr, ARDC to C/S, subj: IRBM Emergency Capability Plan, 28 Dec 56.
15. Memo, Brig Gen C. M. McCorkle, AC/S (GM) to Asst DCS/O, subj: IRBM Emergency Capability, 29 Nov 56; memo, McCorkle to Dir/Plans, subj: IRBM Emergency Capability Study, 7 Jan 57; memo, Col R. E. Soper, Sp Asst, AC/S (GM) to Dir/Plans, subj: IRBM Emergency Capability Plan, 7 Jan 57; memo, Col F. O. Easley, Dep Dir/Ops to Dir/Plans, subj: IRBM Emergency Capability Study, 10 Jan 57.
16. Memo, Gen T. D. White, VC/S to SAF, subj: IRBM Emergency Capability Plan, 9 Jan 57; ASSS, Maj Gen R. C. Lindsay, Dir/Plans to SAF, subj: Provision of the SM-75 (THOR) Weapon System to the British and IRBM Emergency Capability Plan, 17 Jan 57; memo, E. V. Murphree, Sp Asst to SOD/GM to SOD, subj: IRBM Discussions with United Kingdom Representatives, 24 Jan 57; memo, D. A. Quarles, SAF to SOD, subj: Provision of the SM-75 (THOR) Weapon System to the British and IRBM Emergency Capability Plan, 25 Jan 57; memo, Murphree to SOD, no subj, 28 Jan 57; ltr, C. E. Wilson, SOD to Pres, no subj, 28 Jan 57.
17. Memo, R. E. Horner, Asst SAF/R&D to Asst SOD/ISA, subj: US-UK Talks, January 28-February 1, 1957, dtd 7 Mar 57.
18. Memo, Gen T. D. White, VC/S to AFBMC, subj: IRBM Emergency Capability Plan, 29 Mar 57; Minutes of 9th AFBMC Mtg, 29 Mar 57; memo, D. A. Quarles, SAF to VC/S, subj: IRBM Emergency Capability Plan, 5 Apr 57; ltr, C. E. Wilson, SOD to D. Sandys, Minister of Def, UK, no subj, 18 Apr 57; TWX 55351, C/S to SAC, ARDC, and WDD, 26 Apr 57.

~~SECRET~~~~RESTRICTED DATA~~~~RESTRICTED DATA~~

~~SECRET~~

109

19. Minutes of 3d AFBMC Mtg, 29 Mar 56; memo, Col J. E. Dougherty, Dep Ch, Ops Control Div to Dir/Ops, subj: IRBM Overseas Facility Requirements, 21 Aug 56.
20. Memo, Dougherty to Dir/Ops, 21 Aug 56.
21. Minutes of 6th AFBMC Mtg, 10 Nov 56.
22. Presn by Maj Gen B. A. Schriever to NSC, subj: Progress of USAF Ballistic Missile Program During Calendar Year 1956, 11 Jan 57.
23. SAC Strategic Missiles Monthly Progress Report, Jan 57.
24. Memo, Murphree to SOD, 28 Jan 57; ltr, Wilson to Pres, 28 Jan 57; memo, Horner to Asst SOD/ISA, 7 Mar 57.
25. Memo, D. A. Quarles, Dep SOD to SOD, subj: IRBM Deployment in UK, 26 Mar 57; ASSS, Maj Gen K. P. Bergquist, Dir/Ops to DCS/O, subj: Initial Operational Capability, IRBM, 26 Apr 56.

CHAPTER VII

1. Minutes of 9th AFBMC Mtg, 29 Mar 57; Minutes of 10th AFBMC Mtg, 27 May 57.
2. AFPC Advice of Action, 22 May 57; Minutes of 10th AFBMC Mtg, 27 May 57; DOD Directive 4105.48, 19 Jun 57; memo, W. M. Holaday, Spec Asst/GM, OSD to AFBMC, subj: Over-time Requirements of ICBM and IRBM Programs, 16 Jul 57.
3. Memo, Gen T. D. White, C/S to SAF, subj: Defense Against Possible Guided Missiles Program Reduction, 6 Aug 57.
4. Memo, C. E. Wilson, SOD to Pres, no subj, 31 Jul 57; NSC Action 1765, 1 Aug 57.
5. Presn by Maj Gen B. A. Schriever, Comdr, AFBMD to Air Staff, 11 Sep 57.
6. Memo, White to SAF, 6 Aug 57.
7. Memo for Record by Col R. E. Soper, Secy, AFBMC, subj: OSD Review of ICBM/IRBM Program, 10 Aug 57; TWX WDG-8-4-E, AFBMD to ARDC, 10 Aug 57.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

8. Memo, Wilson to SAF, subj: IRBM Program, 13 Aug 57.
9. Memo, Wilson to SAF, subj: Revision of ICBM/IRBM Program, 16 Aug 57.
10. TWX WDG-8-4-E, 10 Aug 57.
11. Minutes of 12th AFBMC Mtg, 11 Sep 57; notes by Col R. E. Soper, Ch, Bal Div, AC/S (GM), 12 Sep 57; Memo for Record by Soper, subj: Revised Ballistic Missile Program, 16 Sep 57.
12. Minutes of 12th AFBMC Mtg, 11 Sep 57; Memo for Record by Soper, 16 Sep 57.
13. See note above.
14. Notes by Soper, 12 Sep 57.
15. Memo, J. H. Douglas, SAF to SOD, subj: Requested ICBM Program Appropriations and Expenditures for FY 1958-FY 1959, 17 Sep 57.
16. Memo, Wilson to SAF, subj: ICBM Appropriations and Expenditures, 19 Sep 57; Memo for Record by Col Soper, no subj, 2 Oct 57; memo, Wilson to SAF, subj: ICBM Program, 5 Oct 57.
17. Memo, Wilson to SAF, 5 Oct 57.

CHAPTER VIII

1. Ltr, Neil McElroy, SOD to Pres, no subj, 3 Dec 57.
2. Memo, Maj Gen J. B. Smart, Asst VC/S to DCS/P&P, no subj, 8 Oct 57; TWX 51210, C/S to Comdr, AFBMD, 8 Oct 57; TWX WDG-10-3-E, AFBMC to C/S, 9 Oct 57; memo, Brig Gen C. M. McCorkle, AC/S (GM) to C/S, subj: Proposed Possible Acceleration of IRBM, ICBM, and WS-1172 Programs, 10 Oct 57.
3. Memo for Record by Col J. J. Courtney, Dep Ch, Bal Div, subj: Meeting with General White, 17 Oct 57; ltr, Brig Gen O. J. Ritland, Vice Comdr, AFBMD to AC/S (GM), subj: Acceleration of the Ballistic Missile Programs, 25 Oct 57; memo, J. H. Douglas, SAF to SOD, subj: FY 1958 Supplemental and FY 1959 Package Augmentation, 14 Nov 57; memo, Brig Gen C. M.

~~SECRET~~

~~RESTRICTED DATA~~

McCorkle to Sp Asst to C/S, subj: Material for Statement on "Immediate Requirements," 27 Dec 57.

4. NSC Action 1800, 10 Oct 57.
5. Memo, McElroy to SAF, subj: IRBM Program, 31 Oct 57.
6. TWX WDG-11-4-E, AFBMD to C/S, 9 Nov 57; ltr, Maj Gen B. A. Schriever, Comdr, AFBMD to C/S, subj: IRBM Program, 13 Nov 57; memo, Brig Gen C. M. McCorkle to C/S, subj: IRBM Program, 22 Nov 57.
7. Memo, Douglas to Sp Asst to SOD/GM, subj: Ballistic Missile Weekly Progress Report, 1 Nov 57; memo, SAF to SOD, no subj, 8 Nov 57; memo, McElroy to SAF, subj: IRBM Program, 13 Nov 57.
8. Memo, Douglas to SOD, 14 Nov 57; memo, SAF to Sp Asst to SOD/GM, subj: Ballistic Missile Weekly Progress Report, 15 Nov 57.
9. Ltr, Schriever to C/S, 13 Nov 57.
10. Memo, SAF to SOD, subj: IRBM Program, 18 Nov 57.
11. TWX 52878, C/S to ARDC, AFBMD, and BMO, 15 Nov 57; TWX, C/S to ARDC, AFBMD, and BMO, 22 Nov 57.
12. Memo, SAF to SOD, no subj, 25 Nov 57; DOD Press Release, 27 Nov 57.
13. Draft memo, W. M. Holaday, Dir/GM, OSD to S/A and SAF, subj: IRBM Program, 25 Nov 57; memo, SAF to SOD, subj: Accelerated IRBM Program, 25 Nov 57; memo, Dir/GM, OSD to S/A and SAF, subj: THOR-JUPITER Missile Systems, 27 Nov 57; Memo for Record by Col R. E. Soper, Ch, Bal Div, subj: IRBM Program, 27 Nov 57.
14. Ltr, Schriever to C/S, subj: Production of Thor and Jupiter IRBM's for Operational Use, 2 Dec 57; memo, Gen T. D. White, C/S to SAF, subj: THOR-JUPITER Decision, 3 Dec 57; ASSS, Soper, Secy, AFBMC to SAF, subj: IRBM Program, 4 Dec 57; Memo for Record by Soper, subj: IRBM Program, 11 Dec 57; memo, White to SAF, no subj, 19 Dec 57; memo, Holaday to JCS, subj: Deployment of IRBM Missile, 20 Dec 57.

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

112

15. Memo, Douglas to SOD, 18 Nov 57; Memo for Record by Soper, 27 Nov 57.
16. History, 7th Air Division, SAC, 1 Jan-30 Jun 58, pp. 62-86.
17. Memo, Douglas to C/S, no subj, 8 Oct 57; memo, Holaday to SAF, subj: Use of Overtime in ATLAS and TITAN Ballistic Missile Programs, 22 Nov 57; memo, Dir/GM to AFBMC, subj: Reinstatement of ICBM Launch Complex #20, Patrick AFB, 27 Nov 57.
18. Ltr, Ritland to AC/S (GM), 25 Oct 57; memo, Douglas to SOD, 14 Nov 57.
19. TWX WDG-10-3-E, 9 Oct 57; ltr, Ritland to AC/S (GM), 25 Oct 57.
20. Memo, Douglas to SOD, 14 Nov 57; memo, McCorkle to Sp Asst to C/S, 27 Dec 57.
21. See note above.
22. Memo, Holaday to AFBMC, subj: Acceleration of ATLAS ICBM Program, 12 Dec 57.
23. Ltr, Ritland to AC/S (GM), 21 Dec 57; memo, McCorkle to Sp Asst to C/S, 27 Dec 57; ltr, Ritland to C/S, subj: Atlas Program Acceleration, 31 Dec 57; Memo for Record by Soper, subj: ICBM Program, 7 Jan 58; TWX 54975, C/S to AFBMD, 10 Jan 58.
24. Presn by Dir/GM, OSD to NSC, subj: The U.S. Ballistic Missiles Program, 30 Jan 58; memo, McElroy to JCS, Dir/GM, and Mil Depts, subj: Ballistic Missile Programs, 10 Feb 58.
25. AFBMD Monthly Status Report, Mar 58.

CHAPTER IX

1. SAC Hist Study 65, SAC Participation in the Missile Program: Early Plans and Developments through March 1957, p 25.
2. WDD Hist Rpt, 1 Jan-31 Dec 56, pp 59-64; memo, D. A. Quarles, SAF to C/S, subj: ICBM Site Planning, 1 Sep 56; memo, C. E. Wilson, SOD to S/A, subj: Camp Cooke, California, 16 Nov 56; AFBMD Monthly Status Rpt, Sep 57.

~~SECRET~~
~~RESTRICTED DATA~~
~~EXCLUDED FROM AUTOMATIC DOWNGRADING~~

3. WDD Hist Rpt, 1 Jan-31 Dec 56, pp 66-69; Minutes of 10th AFBMC Mtg, 27 May 57; AFBMD Monthly Status Rpt, Sep and Oct 57.
4. Ltr, Lt Gen T. S. Power, Comdr, ARDC to C/S, subj: Ballistic Missile Weapon Systems, 14 Aug 56; ASSS, Dir/M&O to C/S, subj: Ballistic Missile Weapon Systems, 24 Aug 56; ltr, Maj Gen G. A. Blake, Asst DCS/O to Comdr, ARDC, subj: Ballistic Missile Weapon Systems, 28 Aug 56; ltr, Col R. M. Grek, Dir/M&O, ARDC to Dir/M&O, USAF, subj: Manpower Requirements for IOC, 21 Nov 56; ltr, Maj Gen T. C. Musgrove, Dir/M&O to Comdr, ARDC, subj: Manpower Requirements for IOC, 30 Nov 56.
5. Ltr, Col J. A. McKerley, Asst Dep Comdr/Resources, ARDC to Dir/M&O, USAF, subj: Manpower Requirements for the Ballistic Missile IOC Program, 14 Jan 57; TWX RDSOO-1-21-E, WDD to C/S, 15 Jan 57; Memo for Record by Maj W. G. Wells, Dep Sp Asst, AC/S (GM), subj: Summary of Current WDD Manpower and Organization Status, 29 Jan 57; ltr, Maj Gen J. W. Sessums, Vice Comdr, ARDC to C/S, subj: Manpower Requirements for the Ballistic Missile IOC Program, 14 Feb 57.
6. Ltr, Maj Gen T. C. Musgrove, Actg Asst DCS/O to Comdr, ARDC, subj: Manpower Requirements for the Ballistic Missile Initial Operational Program, 13 Mar 57; AFBMD Monthly Status Rpt, Jul 57, Sep 57, and Feb 58.
7. AFBMD Monthly Status Rpt, Dec 57 and Jan 58.
8. TWX MCG-3627, Comdrs, AMC, ARDC, and SAC to C/S, 27 Nov 57.
9. Army-Navy-Air Force Journal, 7 Dec 57.
10. TWX WDG-11-16-E, AFBMD to ARDC, SAC, AMC, and AC/S (GM), 29 Nov 57; TWX 53440, C/S to AFBMD, ARDC, SAC, and AMC, 1 Dec 57; TWX 53891, C/S to AMC, 12 Dec 57; TWX 54251, C/S to SAC, ARDC, AMC, and ATC, 20 Dec 57; SAC/AFBMD Memorandum of Understanding, 31 Dec 57.
11. SAC/AFBMD Memo of Understanding, 31 Dec 57; SAC GO 1, 2 Jan 58.

~~SECRET~~

114

12. Many of the reasons for the shift of IOC management responsibilities never appeared in the documents. Maj Gen C. M. McCorkle, AC/S (GM), Col L. C. Brooks, Ch, MsIs Br, Dir/Ops, and Lt Col E. J. Istvan, Bal Div, AC/S (GM), filled in the void.
13. Presn by W. M. Holaday, Dir/GM, OSD to NSC, subj: The U. S. Ballistic Missiles Program, 30 Jan 58; TWX C9159, SAC to C/S and ATC, 24 Dec 57.
14. AFBMD Dev Plan, May 1958.

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

GLOSSARY

AAF	Army Air Forces
AC/AS	Assistant Chief of Air Staff
Acft	Aircraft
AC/S (GM)	Assistant Chief of Staff, Guided Missiles
Actg	Acting
ADC	Air Defense Command
Adm	Admiral
AE	Atomic Energy
AEC	Atomic Energy Commission
Aero	Aeronautics
AFBMC	Air Force Ballistic Missiles Committee
AFBMD	Air Force Ballistic Missile Division
AFC	Air Force Council
AFPC	Armed Forces Policy Council
AFSWC	Air Force Special Weapons Center
AMC	Air Materiel Command
ARDC	Air Research and Development Command
ASSS	Air Staff Summary Sheet
ATC	Air Training Command
ATSC	Air Technical Service Command
AU	Air University
Bal	Ballistic
BMO	Ballistic Missile Office
BOB	Bureau of the Budget
Bud	Budget
CCGM	Coordinating Committee on Guided Missiles
CEP	Circular Probable Error
CIA	Central Intelligence Agency
CinC	Commander-in-Chief
Cmte	Committee
Comdr	Commander
Cong	Congressional
C/S	Chief of Staff
DCG	Deputy Commanding General
DCS/D	Deputy Chief of Staff, Development
DCS/M	Deputy Chief of Staff, Materiel
DCS/O	Deputy Chief of Staff, Operations
DCS/P&P	Deputy Chief of Staff, Plans and Programs

~~SECRET~~

115
~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT~~

Def	Defense
Dep	Deputy
Dir/GM	Director of Guided Missiles
Dir/Ops	Director of Operations
Dir/Plans	Director of Plans
DOD	Department of Defense
Engr	Engineering
Exec	Executive
GM	Guided Missile(s)
GMC	Guided Missile Committee
GO	General Order
Hist	History, Historical
HOI	Headquarters Office Instruction
IBMS	Intercontinental Ballistic Missile System
ICBM	Intercontinental Ballistic Missile
IOC	Initial Operational Capability
IRBM	Intermediate Range Ballistic Missile
ISA	International Security Affairs
JCS	Joint Chiefs of Staff
JSPC	Joint Strategic Planning Committee
JSPG	Joint Strategic Planning Group
Jt	Joint
M&O	Manpower and Organization
M&S	Materiel and Services
Mgmt	Management
Mil	Military
Msl	Missile
Mtg	Meeting
NAA	North American Aviation, Incorporated
NATO	North Atlantic Treaty Organization
NSC	National Security Council
OC&R	Operations, Commitments, and Requirements
ODM	Office of Defense Management <i>Mobilization</i>
Ops	Operations
OSD	Office of the Secretary of Defense
OSD-BMC	Office of the Secretary of Defense Ballistic Missiles Committee

~~SECRET~~

117

P&P	Plans and Programs
Presn	Presentation
Prog	Program
Projs	Projects
RAF	Royal Air Force
R&D	Research and Development
Rpt	Report
Rqmt	Requirements
R&R	Routing and Record Sheet
S/A	Secretary of the Army
SAC	Strategic Air Command
SAF	Secretary of the Air Force
Sec	Section
Secy	Secretary
SMEC	Strategic Missiles Evaluation Committee
SOD	Secretary of Defense
Sp	Special
Strat	Strategic
Svs	Services
TAC	Tactical Air Command
TBM	Tactical Ballistic Missile
TCP	Technological Capabilities Panel
TI	Technical Instruction
TWX	Teletype Message
VC/S	Vice Chief of Staff
WDD	Western Development Division
Weap	Weapon

~~SECRET~~

~~RESTRICTED DATA~~

~~TOP SECRET - FROTH~~

~~SECRET~~

INDEX

A

Aircraft and Weapons Board, 11,

40, 51

Air Force Ballistic Missile Di-

vision, 66-67, 70, 76-77, 80-81,

85-86, 88-97; Dep Comdr/Plans

& Ops, 93-94

Air Force Ballistic Missiles Com-

mittee, 21, 27, 37-38, 40-43,

51-53, 54n, 55, 58-60, 63-65, 70,

87, 91, 96

Air Force Council, 11, 40, 42-43,

51-53, 91

Air Force Plan for Simplifying Ad-

ministrative Procedures for the

ICBM, 21

Air Force Special Weapons Center, 7

Air Materiel Command, 1-3, 34-35,

53, 89, 93-94

Air Research & Development Com-

mand, 9, 12, 28-30, 32-36, 38-40,

46-47, 49-50, 53-54, 70, 91-95

Air Technical Service Command, 1

Air Training Command, 34-35, 89,

95n

Anderson, Sen Clinton P., 15-19

Anderson, Lt Gen Samuel E., 93

Appropriations, House Committee

on, 68

Armed Forces Policy Council,

5-6, 10-11, 76

Armed Services, Senate Com-

mittee on, 81

Army, 19, 23-24, 25n, 78, 81

Army Air Forces, 1-3

Atlas, 4, 7-15, 19, 41, 46, 65n,

66-72, 75, 84-87, 90-91, 93,

97

Atomic Energy Commission, 7

B

B-52, 65n

Ballistic Missile Office (AMC), 93

Ballistic Missiles Committee. See

~~SECRET~~

118
~~RESTRICTED DATA~~
~~ATOMIC ENERGY ACT 1954~~

~~SECRET~~

119

Air Force Ballistic Missiles Com-
mittee; Office of Secretary of De-
fense Ballistic Missiles Committee.

Bermuda conference, 61-62, 73

Bode, Hendrik W., 6n

Boojum, 2

Brentnall, Maj Gen Samuel R., 41

British, 22, 49, 51-52, 54-62, 73,

83-84, 98

Budget, Bureau of, 77

C

Camp Cooke, Calif., 90

Central Intelligence Agency, 11-12

Chief of Staff, USAF, 8, 12, 21, 28,

33, 40-41, 68, 91. See also

Twining; White,

Congress, 14-15, 67-68, 74, 76-77, 81

Consolidated-Vultee Aircraft Corp.

(Convair), 2-4, 9, 12, 48

Cooke AFB, Calif., 85n, 90-92, 95

D

Defense, Department of, 9, 11-12,

17-20, 22-23, 25, 27-28, 31,

35, 44, 53, 58, 65-69, 71,

75-77, 79-82, 84-86, 87n

Defense Management, Office of,

17

Development, DCS, 12

Douglas, Secretary James H., Jr.,

67, 72, 77-80, 82-84, 87

Dunn, Louis G., 6n

E

Eisenhower, President Dwight D.,

14-19, 25-26, 44-45, 53-55, 61,

68, 74, 77-78, 81, 87

Eisenhower Administration, 5, 35,

45, 48, 55, 59, 61, 63-66, 70-71,

73, 75-76, 81, 84, 88, 96

F

1st Missile Division, 92, 94

Funk, Brig Gen Ben I., 93

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY~~

G

Gardner, Trevor, 5-11, 13-16, 19-21,
28
Germany, 1
Gillette, Hyde, 20
Gillette Committee, 20-21, 28-29, 95;
Report, 21, 28
Goose, 65n
Guided Missiles, Asst C/S for, 12,
41, 78
Guided Missiles, Committee on (R&D
Board), 3
Guided Missiles, Coordinating Com-
mittee on, 9, 11
Guided Missiles, Sp Asst for (DOD),
44
Guided Missiles, Special Study Group
on, 5-7

H

Holaday, William M., 81, 84, 86-87,
96
Hound Dog, 65n
Hyland, Lawrence A., 6n

I

IBMS, 10
ICBM Administrative Procedures
Evaluation Group, 20
IRBM #1, 24-25
IRBM #2, 24-25
IRBM Emergency Capability Plan,
55
Inglewood, Calif., 12, 93

J

Jackson, Sen Henry M., 15-18
Joint Chiefs of Staff, 10, 18-19,
23, 31, 76-77; Chairman, 24
Joint Congressional Committee
on Atomic Energy, 15
Jupiter, 24, 25n, 64, 65n, 66, 69,
71-73, 75, 77-79, 81-82, 87

K

Keyes, Roger M., 11-12
Killian, James R., 17
Killian Report, 17, 22
Kistiakowsky, George B., 6n

L

Lauritsen, Charles C., 6n
LeMay, Gen Curtis E.: CinC SAC,
33, 38-40, 50; VC/S USAF, 70,
81
Lowry AFB, Colo., 91

Mc

McCorkle, Brig Gen Charles M., 79
McElroy, Secretary Neil, 75, 77-79,
81-82
Macmillan, Prime Minister Harold,

61

M

Martin Company, Glenn L., 48
Military Applications, Subcommittee
on, 15
Millikan, Clark B., 6n
Missile units. See numbered units.
MRBM, 22
Murphree, Edgar V., 44-45
MX-1593, 4

N

National Security Council, 10, 13,
16-19, 22-23, 25, 42, 44-45,
53, 55, 65-69, 76-77, 87, 96;
Planning Board, 17-18, 44
Navaho, 2, 65n
Navy, 3, 19, 22-24, 25n
North American Aviation, Inc.,
2, 12
Northrop Aircraft, Inc., 2

O

Office of Secretary of Defense
Ballistic Missiles Committee,
21, 27, 44, 53, 54n, 55, 65,
87, 96
Operations, DCS, 31-32
Operations, Directorate of, 31-32,
49

P

Polaris, 25n, 65n, 66
Power, Lt Gen Thomas S., 33,
38-40, 50, 56, 93, 97

~~SECRET~~~~RESTRICTED DATA~~~~ATOMIC ENERGY ACT 1954~~

President. See Eisenhower.

S

Puckett, Allan E., 6n

Sandys, Duncan, 60-61

Putt, Lt Gen Donald L., 12

Schriever, Brig Gen Bernard A.,

12, 16, 38, 40, 44, 53, 68-71,

78, 93-94

Q

Quail, 65n

Science Advisory Committee

(ODM), 17

Quarles, Donald A.: Asst/R&D (DOD),

9, 11; SAF, 20-21, 26, 29, 41-45,

Secretary of Air Force, 5, 20,

51, 53, 57-60, 90; Dep SOD, 71, 83

41, 59, 67, 79. See also

R

Talbott; Quarles; Douglas.

Radford, Adm Arthur W., 24

Secretary of Defense, 5, 16, 18,

Ramo, Simon, 6n

21, 25, 69; Asst/R&D, 9, 11;

Ramo-Wooldridge Corporation, 6, 12

Deputy, 11, 19. See also

RAND Corporation, 3, 7

Wilson, McElroy.

Rascal, 65n

704th Strategic Missile Wing, 92,

Rawlings, Gen Edwin W., 93

94

Redstone Arsenal, 24

706th Strategic Missile Wing

Research and Development, Sp Asst

(Atlas), 93-94

for (Air Force), 5

672d Strategic Missile Squadron

Research and Development Board,

(Thor), 93

3

6952d Support Squadron (Missile

Robertson, Reuben B., 19

Technical), 92

Royal Air Force, 83-84, 98

SM-65, 40

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

SM-68, 40

Snark, 2, 65n

Sputnik, 64, 73-75, 83

State, Department of, 59

Strategic Air Command, 29-36, 39,

47, 49-52, 54, 59-60, 89, 92-97;

Office of Asst CinC SAC for Mis-
siles, 95

Strategic Missiles Evaluation Com-

mittee, 6-11, 28

T

Talbott, Secretary Harold E., 5, 9-11,

13-16, 19, 28

TBM, 31

Teapot Committee, 6

Technological Capabilities Panel, 17,

22

Thor, 24, 25n, 29, 51, 55, 60, 64,

65n, 66-73, 75, 77-84, 87, 90,

92-93, 98

392d Air Base Group, 92

392d Missile Training Squadron (Thor),

92

Titan, 14-15, 40-41, 46-47, 65n,

66-72, 75, 84-87, 90-91

Twining, Gen Nathan F., 8, 10-11,

26, 43, 68n

U

Union of Soviet Socialist Repub-

lics, 9, 12, 14, 16, 18, 22, 28,

34, 42, 45, 56, 64, 68, 73-75

V

V-1, 1

V-2, 1

Vandenberg AFB, Calif., 90, 98

Vice Chief of Staff, USAF, 21, 70.

See also LeMay; White.

Viking, 3

Von Neumann, Dr. John, 6, 13

Von Neumann Committee, 6

W

Warren AFB, Wyo., 91, 93, 95

Western Development Division,

12-13, 28, 34-35, 37-43, 50-52,

54, 56-57, 66n

~~SECRET~~

124

Westover, Brig Gen Charles B., 94

White, Gen Thomas D.: VC/S USAF,

21, 29-32, 35-40, 42-43, 50, 57-58;

C/S USAF, 65-68, 76-77, 82, 85,

93-94, 97

Wiesner, J. B., 6n

Wilson, Secretary Charles E., 5, 13,

16, 18-21, 24-26, 37, 44-45, 57,

59-61, 64-67, 69-70, 72, 75, 78,

90

Wooldridge, Dean, 6n

~~SECRET~~

~~RESTRICTED DATA~~

~~ATOMIC ENERGY ACT 1954~~

1944

1. The first part of the report is a summary of the work done during the year.

2. The second part is a detailed account of the work done during the year.

3. The third part is a summary of the work done during the year.

4. The fourth part is a summary of the work done during the year.

5. The fifth part is a summary of the work done during the year.

6. The sixth part is a summary of the work done during the year.

7. The seventh part is a summary of the work done during the year.

8. The eighth part is a summary of the work done during the year.

9. The ninth part is a summary of the work done during the year.

10. The tenth part is a summary of the work done during the year.

11. The eleventh part is a summary of the work done during the year.

12. The twelfth part is a summary of the work done during the year.

13. The thirteenth part is a summary of the work done during the year.

14. The fourteenth part is a summary of the work done during the year.

15. The fifteenth part is a summary of the work done during the year.

16. The sixteenth part is a summary of the work done during the year.

17. The seventeenth part is a summary of the work done during the year.

18. The eighteenth part is a summary of the work done during the year.

19. The nineteenth part is a summary of the work done during the year.

20. The twentieth part is a summary of the work done during the year.

21. The twenty-first part is a summary of the work done during the year.

22. The twenty-second part is a summary of the work done during the year.

23. The twenty-third part is a summary of the work done during the year.